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THE
FOUR LITTLE
WISE ONES.

[illegible]

THE ANTS are a people not strong, yet they prepare their meat in the summer.

PROV. XXX 25.

THE FOUR

LITTLE WISE ONES.

"All thy works praise thee, O Lord; and thy saints give thanks unto thee."
Psalm xlv. 10, *Prayer Book Version.*

"The works of the Lord are great, *sought out* of them that have pleasure therein." Psalm cxi. 3.

"'Tis wonderful
That an invisible instinct should frame them
To royalty unlearn'd; honor untaught;
Civility not seen from others; valour,
That wildly grows in them, but yields a crop
As if it had been sow'd." SHAKSPEARE's *Cymbeline.*

"How inexhaustible are the resources of Divine wisdom, when the outgoings of it in the meanest insects are so wonderful!"—GOSSE.

IOTHECA·BODL

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To the Children of a very dear Brother, this compilation is dedicated, as a small testimony of grateful affection, by his Sister.

The names of the authors from whom she has extracted are not always told, but they will be easily recognised by any older readers she may have; and she hopes the young ones will forgive this omission.

PREFACE.

BY THE REV. DR. BAYLEE,

OF HOLY TRINITY CHURCH, AND ST. AIDAN'S COLLEGE, BIRKENHEAD.

"THE works of the Lord are great; sought out of all them that have pleasure therein." Creation is the expression of the Divine mind. In its complex Unity we have a truly marvellous illustration of that fundamental dogma of Divine Revelation, the complexity of the Divine Unity—Father, Son, and Spirit, Three Persons in One Godhead. The word Universe (turning upon One) beautifully indicates the inter-connection of all the parts of creation.

All creation is presented to our adoring contemplation as one whole; and yet each of its parts exhibits in itself the exhaustlessness of the Divine Creator. Infinity is stamped upon every minute portion of the works of God. Who has ever been able to arrive at the minutest atom? When we imagine to have approximated to it by some powerful microscope, some new discovery in microscopic improvements enables us to penetrate further still; and we find that, instead of being at the threshold of our hopes, there is still an infinite distance between us and the last degree of minuteness.

"O Lord, how manifold are thy works! in wisdom hast thou made them all!" was the exclamation of the pious Psalmist of old. Succeeding ages have added much to our knowledge of the Divine works—adding fresh force to the devout exclamation, and giving us some idea of the eternal development of the works of God, without ever coming to an end.

Greatness in smallness is a principle admirably illustrated by the microscope; the same thought is inculcated in the inspired words of which this little volume is an exposition—"There be four things which are little upon the earth, but they are exceeding wise." All the knowledge which we aggregate from generation to generation does not give us new principles, only new illustrations of well-established principles. In this the goodness and wisdom of God are greatly manifest. A few years of early life are the season for imbibing correct moral principles; the remainder of one's days only carry out and enforce these. We have no occasion to learn new principles.

Indeed, ten brief commandments sum up all our moral and spiritual duties. Even these can be reduced to two, and these again to one simple power—love.

The whole Bible, in all its moral teaching, is only varied illustrations of the application of these brief principles. Thus it is in morals as it is in physical things. The four little ones are exceeding wise; they are wise teachers too, for we may go to them and learn wisdom.

The following work is a careful compilation from various authors, illustrative of the manners and habits of these curious creatures. The author lays no claim to original observation. She desired to benefit the children of a beloved brother; and she hopes that what has been collected for the sake of the children of a dear brother may be useful to other children.

With this hope she ventures to send forth the result of somewhat varied reading; and commends it to the blessing of Him, for the elucidation of whose Word the compilation was made.

The wisdom of God, as seen in His works, is the marvellous power of Him who is, in a still higher and more glorious sense, "the wisdom of God and the power of God."

"My Father worketh hitherto, and I work." "All things whatsoever the Father doeth, these also doeth the Son likewise." In this respect, the four little wise ones remind us that their Creator is our Redeemer. Yes; and *their* Redeemer also; for the *whole* creation waiteth for the adoption, the redemption of our body—made subject to vanity for our sins' sake. It awaiteth the hour when the Son of Man shall renew creation into that "new heaven and new earth wherein dwelleth righteousness."

Jesus sent us to the lily of the field to learn the character of our heavenly Father's love. The lily was an ornament of the chapiter of the pillar in the Temple, to tell us of the new creation which is to be unfading and eternal.

We are thus enabled to rise from Nature to Grace, and from Grace to Glory; and in doing so, we are encouraged to adopt the Psalmist's words, "Thou sendest forth thy Spirit, they are created: and thou renewest the face of the earth; the glory of the Lord shall endure for ever." "I will sing praise to my God while I have any being; my meditation of him shall be sweet: I will be glad in the Lord."

THE FOUR LITTLE WISE ONES.

I THINK there are few people who have not experienced discouragement from a sense of their own insignificance. Without staying to consider whether such despondency be the offspring of pride or of humility, have you not often said, or at least thought, "Oh, I am so little, so weak, I can be of no use;" and then you may add, "Are we not right in saying so? what *can* a *child* do?" What can a child *not* do, if a sense of his weakness and insignificance lead him, in obedience to his Divine Creator, to put his whole trust in His Almighty help? But there is also a very important caution needed here.

If *one* be in despair on account of his inability to do what is right, *another* may perhaps congratulate himself on that insignificance which releases him, as he supposes, from responsibility. A mighty mistake is this, as those who consider these "four little people" may soon discover. Who that reads the fearful desolations these creatures are suffered to effect over some of the fairest parts of God's creation, and the destruction of man's honest labour, can refrain from at once wondering and fearing; lest, small though he be, as an atom in creation, he may be of those who follow the multitude to do evil, bringing on themselves the curse of the wicked, as well as inflicting it on others? On the other hand, how pleasant it is to reflect that while "all His works praise Him," to the meanest of His saints it is given to "bless His name,"—that small, and powerless, and often helpless as we are, He has not left us to fight the battle alone, but has surrounded us with brethren, whom it depends on ourselves to make our *friends;* so that, imitating the ant in foresight, the coney in faith, the locust in friendship and good-fellowship, and the spider in industry, we may, though still "little upon earth, be exceeding wise," "laying up for ourselves a good foundation against the time to come;" finding His words, and hiding them in our hearts for the day of need; making our nest in the Rock of Ages; and from that stronghold issuing forth beloved and loving, to the help of our brethren. With such examples, with such warnings, what may we not do?

Dear children, this little book, intended for your amusement, would fain give a reply to the question. And be it remembered, that he to whom but one talent was given, was condemned not for the insignificance of his abilities, but for neglecting to improve the little he had in his power. "He that is faithful in that which is least, is faithful also in much."

With few exceptions, there are no Scripture characters, however excellent in some respects, of whom the Spirit of truth does not also record the failings, or the crimes. If, then, we shall find, on reading the histories of these insects, that there is much to avoid as well as to imitate, we shall not be surprised that some of them are held out as *our* examples in the Holy Scriptures.

Well may we shudder with surprise and dismay, when finding how vexatious, nay, how dangerous to life itself, may such little creatures become. And such should *you* be, "little upon earth" as children are, but for the restraining hand of a gracious Providence; sometimes arresting the young transgressor by sickness or by death; sometimes making his own folly his punishment; sometimes bringing him back by the cords of love to the paths of uprightness.

Never can the sins of children be reckoned small, or of no account, when the Almighty has given them so many directions, and stood forth Himself, in the person of His beloved Son, to show us how a child may "grow in wisdom and in stature, and in favour with God and man." Did you then ever read in the book of Solomon's Proverbs, till you came to the 30th chapter, and there found it said that the following words were uttered by Agur the son of Jakeh; and let me tell you, by the bye, that the name "Agur" signifies a gatherer,—one that did not compose things himself, but collected the wise sayings and observations of others—made abstracts of others' writings.

Now this ought to be my name, because such is my intention. I have read so many entertaining stories about the "little people" treated of in my little book, that I intend to collect them, and give them to you to read all together.

Proverbs xxx. 24: "There be four things which are little upon the earth, but they are exceeding wise: (25.) The ants are a people not strong, yet they prepare their meat in the summer; (26.) The conies are but a feeble folk, yet make they their houses in the rocks; (27.) The locusts have no king, yet they go forth all of them by bands; (28.) The spider taketh hold with her hands, and is in king's palaces."

As there may be some young people who have not yet at all studied natural history, it may be as well for them, before entering on a particular description of the "four," to read a short account of insects in general. It will, probably, be considered *dry* by some, but they will be rewarded by a clearer understanding of the proceedings of these little wise ones, when they see how they have been provided by Him who "in wisdom made them all."

Insects are animals which have a body consisting of one or more divisions—articulated feet, a head conspicuously distinct from the body, on which are placed two moveable horns, called antennæ. They breathe through air-holes, which are situated on the sides of the body; the greater number have wings in their perfect state, and only a proportionably small number are actually without them. With the exception of certain groups, all insects have six feet, and their bodies are divided into a head, thorax, and abdomen, by notches or incisions: hence the word insect is derived from the Latin word *insceare,* to cut or notch. All insects come from eggs.

The head contains the oral apparatus, and the instruments of the senses, including the antennæ or feelers, which are articulated organs, presenting great variety of shape, but invariably only two in number. The thorax, formed by the union of three segments of the skeleton, supports six articulated legs, and sometimes four or two wings; these last, however, are frequently wanting. The abdomen is destitute of legs.

But before arriving at the perfect condition in which they exhibit the above mentioned characters, they undergo a series of changes, both in outward form and internal structure, which constitute what is generally termed their metamorphosis. This is the case with the ants and locusts. The difference in the spiders will be spoken of further on.

The legs of insects are invariably six in number; considered separately, every leg may be seen to consist of several pieces, connected together by articulations of different kinds. The first division of the leg, or that in immediate connexion with the thorax, to which it is united by a kind of ball-and-socket joint, is called *coxa,* the hip, and upon this, as upon a centre, the movements of the limb are performed. To the extremity of the hip a small moveable piece is attached, called the *trochanter,* to which succeeds the *femur,* thigh, which is the thickest and most robust of all the divisions of the limb. The next piece, called *tibia,* the shank, is occasionally of considerable length, and is connected to the last by a hinge: to its extremity is appended the foot, *tarsus,* composed of a consecutive series of small segments, varying in number from five to one, the last of which is armed with claws, adapted to different kinds of progression. The above general description of the leg of an insect will prepare us to examine various modifications in outward form and mechanical arrangements, by which these simple organs are adapted to progression under a great variety of circumstances.

The wings of insects differ much in texture. Few things are met with in nature more admirable than these structures: they present, indeed, a combination of strength and lightness absolutely unequalled by anything of human invention, and, as instruments of flight, they far surpass the wings of birds, both in the power and precision of their movements, inasmuch as these insects can fly in all directions, backwards, or to the right or left, as well as forwards.

In some insects the force of the muscles which move their wings is so great, that they seem never to be wearied with flying. In others the wings are much more feebly organized, but their structure is similar. In several orders the anterior pair of wings is converted into shields, for the protection of the posterior. The hard covering of an insect, like the skin of vertebrate animals, consists of three distinct layers. The outer *stratum,* or *epidermis,* is smooth, horny, and generally colourless, so that it forms a dense inorganic film spread over the whole surface of the body. Immediately beneath the *epidermis* is a soft and delicate film, *rete mucosum,* which is frequently painted with the most lively hues, and gives the characteristic colouring to the species. The third and principal layer is the true skin or *cutis,* which is generally of a leathery texture, abundantly supplied with nutritive juices, and in its substance the bulbs of hairs, scales, and similar appendages are embedded and nourished.

The wings are mere derivations from this common covering, and are composed of two delicate films of the epidermis, stretched upon a strong and net-like framework.

The muscular system of insects has always excited the wonder and astonishment of the naturalist, in whatever point of view he examines this part of their economy,—whether he considers the perfection of their movements, the inconceivable minuteness of the parts moved, or the strength, persistence, or velocity of their contractions. Insects are proverbially of small comparative dimensions, "minims of nature,"

————————"That weave their limber fans
For wings, and smallest lineaments exact,
In all the liveries decked of summer's pride."

Their presence, indeed, around us, is only remarked as conferring additional life and gaiety on the landscape; and except when, by some inordinate increase in their numbers, they make up by their multitude for their diminutive life, the ravages are trifling and insignificant.

The mouths of insects may be divided into two great classes—those which are adapted for biting, forming what is called a perfect or mandibulate mouth, and those which are so constructed as only to be employed in sucking, constituting the suctorial or haustellate mouth. It is in the former of these divisions that all the parts composing the oral apparatus are most completely developed.

The upper pair of jaws (mandibulæ) are two hard and powerful hooks, placed immediately beneath the upper lip, and so articulated with the cheeks, that they move horizontally, opening and shutting like the blades of a pair of scissors. In the locust tribes these are efficient agents in cutting and masticating leaves and vegetable matters adapted to their appetites.

Beneath the mandibles is situated another pair of jaws, of similar construction, but generally smaller and less powerful; these are called the maxillæ.

The chin (*meatum*) joins the interior border of the mouth, and a fleshy organ, reposing on the chin, internally, is the *lingua* or tongue of the insect.

These appendages or auxiliary instruments inserted upon *maxillæ* and the *labium*, are usually named the palpi or feelers, and constitute special organs of touch, adapted to facilitate the apprehension, and to examine the nature of the food.

In the suctorial orders of insects the mouth is adapted to the imbibition of fluid nutriment, and consequently constructed upon very opposite principles; yet, notwithstanding the apparent want of resemblance, it has been satisfactorily demonstrated by Savigny, that the parts composing a suctorial mouth are fundamentally the same as those met with in the mouth of mandibulate insects, but transformed in such a manner as to form a totally different apparatus. Messrs. Kirby and Spence tell us there are five kinds of imperfect mouth adapted to suction.

The respiratory organs of insects, as well as their circulatory apparatus, are constructed upon peculiar principles, and are evidently in relation with the capability of flying, which distinguishes these minute, yet exquisitely constructed articulated animals. Any localized instruments for breathing, whether assuming the shape of bronchiæ or lungs, would materially have added to the weight of the body; and, moreover, have rendered necessary an elaborate apparatus of arteries and veins for conveying the blood to and fro, for the purpose of purifying it, by securing its exposure to the influence of air. By the plan adopted, however, all these organs are dispensed with; and the organs of respiration, so far from increasing the weight of the animal, actually diminish its specific gravity to the greatest extent possible. The blood, in fact, in insects, is not brought to any given spot to be exposed to oxygen; but the air is conveyed through every part of the system by innumerable tubes provided for that purpose; and thus, all the complicated parts usually required to form a vascular system are rendered unnecessary. These observations, however, only apply to the insect in its perfect state: for in the larva and pupa condition, where flight is not possible, various additional organs, frequently of considerable bulk, are provided.

One of the obscurest points of the physiology of insects has always been that of the circulation of their blood. The most superficial observer of many of the large thin-skinned larvæ could scarcely fail to observe the evident regular pulsation of a fluid in a vessel running along the back, and it was naturally considered that this fluid is analogous to the blood of larger animals; but as even the microscopic observations of Swammerdam and Lyonet had never detected anything like blood-vessels in other parts of the body of insects, a circulating system has been generally denied to this class, which in this circumstance has been thought to differ from some of the classes immediately connected with it. It was reserved for that eminent physiologist, Carus, of Dresden, physician to the king of Saxony, to remove this obscurity by the interesting and important discovery which he made and published a few years ago, of a distinct circulation of the blood in insects.

The nervous system of insects is a most astonishing piece of mechanism, well worthy the attention of the student of nature. From the brain, all the nerves appropriated to the special instruments of the senses are derived, so that it may naturally be regarded as the chief seat of sensation and intelligence.

The sense of *touch* is indubitably bestowed upon all insects; and to judge from the perfection of the edifices which they build, and the precision of their usual operations, this must be extremely delicate. The antennæ, or feelers, as they are popularly called, have been very generally regarded as being peculiarly instruments of touch; and whoever watches the proceedings of an insect in which these appendages are largely developed, will easily convince himself that they are employed to investigate surrounding objects by contact; but naturalists are not agreed as to the seat of this sense.

Whether the sense of *taste* exists in insects, as a distinct sense, may admit of dispute; the tongue seems but little adapted to appreciate savours, and all opinions assigning the function of taste to other parts are purely conjectural.

Many insects are certainly capable of perceiving odours; but the seat of this sense has not been ascertained. Nor are we better informed concerning the organs of *hearing;* but that insects are capable of perceiving sounds is proved by the fact of many tribes being capable of producing audible noises, by which they communicate.

The eyes of insects are of two kinds, simple and compound: the former being insulated visual specks, while the latter consists of agglomerations of numerous distinct eyes, united so as to form most elaborate and complex instruments of sight.

With respect to the number of eggs laid by insects, it varies in different species; but they are in general most abundant; and but for the innumerable means employed by the All-wise to keep the balance between the increase and destruction of insect tribes, they would become intolerable plagues to mankind: but *He* hath set them their bounds, who laid the foundations of the world. Among the most remarkable provisions for preventing superabundant fertility, is that law which compels the most prolific insects to live in large societies, and permits but one female out of a multitude to lay eggs. Were it not for such a restriction, many insects—for instance, the termites ants—would soon, by their overwhelming increase, depopulate whole regions of the earth, and render the countries in which they are met with absolutely uninhabitable, by their extreme voracity.

Allusion is made in Holy Writ to many insects. They are represented as employed divinities, sometimes to annoy the enemies of the Israelites, and at others to punish that people, when they apostatized from their God. The prophets frequently introduce them as symbols of enemies that lay waste or oppress the Church; as the *fly* of the Ethiopians or Egyptians, the *bee* of the Assyrians, and the *locust* of the followers of Mahomet, and other similar destroyers.

Let us begin by thinking of the ants, those industrious little creatures which most of us have often watched with so much wonder; which some of us have feared and disliked, but which are, nevertheless, so good an example for us, that the wisest of men tells us to "go to the ant, to *consider* her ways and be wise, which, having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest." The formicæ are called among us pismires, ants, or emmets—a list of their names will be found at the end of this book.

Ants, like bees, are divided into males, females, and neuter, or rather females, who, not being fitted and destined by the Divine Creator to bear young, are labourers for the benefit of the entire community.

Those who have young do nothing but live, and nurse them: the others provide food, construct the habitations, nurture the young, and guard the citadel. In building they exhibit much ingenuity, every one seeming to follow his own fancy. Both the male and female have wings; and when the heat has arisen to a certain height, they issue from their habitations, escorted by the labourers, who offer them food during the first stage of their being. Soon after they take flight, the males are left to themselves, and, being unprovided with food, and incapable of procuring it, they soon die of want;* while the females pursue their course to some little distance and seek out habitations, where, finding themselves destitute of labourers, they begin to work, in order to procure food for themselves. Those few females which remain behind in the immediate neighbourhood, are forcibly taken back by the labourers, who deprive them of their wings, (most naturalists say the females perform this operation themselves) feed them, and attend them till they have deposited their eggs. Great police in their little labours prevents disorder and confusion—each has its task. The form of their nest is that of an arched vault leading into a cave, contrived by their removing the mould with their jaws—while, therefore, one labourer casts out the mould it has loosened, another is returning home to work—others providing meat for the queen—others fostering the young.

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* Captain Havrefield, R.N., gives an account of an extraordinary appearance of ants, observed by him in the Medway, in the autumn of 1814, which is confirmed by the surgeon of the Clorinde, Dr. Bromley, to Mr. McLeay. "In September, 1814, being on the deck of the hulk to the Clorinde, my attention was drawn to the water by the first Lieut. Havrefield observing there was something black floating down with the tide. On looking with a glass, I discovered they were insects. The boat was sent, and brought a bucketful of them on board; they proved to be a large species of ant, and extended from the upper part of Salt-pan Reach out towards the Great Nore, a distance of five or six miles. The volume appeared to be in breadth eight or ten feet, and in height about six inches, which I suppose must have been from their resting one upon another." These ants were winged. Whence this immense column came was not ascertained. From the numbers here agglomerated, one would think that all the ant-hills of Kent and Surrey could scarcely have furnished a sufficient number of males and females to form it. When Colonel Sir Augustus Frazer, of the Horse Artillery, was surveying, on the 6th October, 1813, the scene of the battle of the Pyrenees, from the summit of the mountain called Pera de Aya, or les Quartres Couronnes, he and his friends were enveloped by a swarm of ants so numerous as entirely to intercept their view, so that they were glad to remove to another station in order to get rid of them.

Modern naturalists question the ant's hoarding up grains against winter for its sustenance. One of the most able and patient in his investigations into the manners and customs of these curious insects, pointedly denies their doing so. The learned author of "Introduction to Entomology" says, "there is not a word in Scripture implying that the ant stores up grain or other provision. She prepares her bread and gathers her food, namely, such food as is suited to her, in summer and harvest; that is, when it is most plentiful; and then shows her wisdom and prudence by using the advantages offered to her." The words thus interpreted will apply to the species among us, as well as to those that are not indigenous: and another eminent writer says, "their care and foresight in laying up a store of provision against the winter, are no other than pleasing fictions, which, however they amuse the fancy, have no existence in reality. During the winter they either become torpid or die." We may observe, by the way, that, according to Huber, ants become torpid at 2° Reaumur; and previously lay themselves as closely as possible together.

But, on the other hand, it has been wisely observed, till the manners of exotic ants are more accurately explored, it would be rash to *affirm* that no ants have magazines of provisions: for although, during the cold of our winter in this country, they remain in a state of torpidity, and have no need of food, yet, in warmer regions, during the rainy seasons, when they are probably confined to their nests, a store of provisions may be necessary for them. Even in northern climates, against wet seasons, they may provide in this way for their sustenance, and that of the young brood; which, as Mr. Smeathman observes, are very voracious, and cannot bear to be long deprived of their food. It is very important to mark the vast difference between the habits of European ants and those of tropical climates. Bingley says of these, "they build their nests with a dexterity, lay up provisions, and submit to regulations entirely *unknown* among those of Europe."

Burmeister also remarks on this subject, "the information we have received as to the time of appearance of tropical insects is so imperfect, that scarcely any thing satisfactory can be deduced from it."

According to the letter of Westermann to Wiedermann, which is interesting from the intelligence it gives us of the habits of many tropical insects—insects are found in Java, Bengal, and at the Cape, *only during* the rainy season, during which the whole tropical vegetation is in its highest luxuriance; and they then swarm upon flowers and leaves, seeking nutriment. Where they conceal themselves during the hot season is not yet known with certainty; yet they doubtlessly seek places of retreat similar to those sought out by our own during winter. Thus the hot temperature of a tropical summer has the same effect upon insects as the cold of winter with us; and what lures them from their hiding-places with us, drives them *there* into their concealed places of resort. Yet it is the same law which is in force, and by which insects are especially bound to the luxuriant increase of the vegetable kingdom; for it is only during the warm rainy season that tropical plants are in blossom, and they are then visited by insects of all descriptions. These observations may be followed up by those made by Dr. Darwin, during his interesting progress in the Beagle, along the shores of South America, &c.

"When we first arrived at Bahia Blanca, Sept. 7, 1832, we thought nature had granted scarcely a living creature to this sandy and dry country. By digging, however, in the ground, several insects, large spiders, and lizards were found in a torpid state. On the 15th, a few animals began to appear, and by the 18th (three days from the equinox) every thing announced the commencement of spring. The plains were ornamented by the flowers of a pink wood-sorrel, wild peas, denotheræ, and geraniums; and the birds began to lay their eggs. . . . . During the first eleven days, whilst nature was dormant, the mean temperature, taken from observations made every two hours, was 51°, and in the middle of the day, the thermometer seldom ranged above 55°. On the eleven succeeding days, in which all living things became so animated, the mean was 58°, and the range in the middle of the day between 60° and 70°. Here, then, an increase of seven degrees in mean temperature, but a greater one of extreme heat, was sufficient to awake the functions of life. At Monte Video, from which we had just before sailed, in the twenty-three days included between the 26th July and the 19th August, the mean temperature, from 276 observations, was 58° 4., the mean hottest day being 65° 5., and the coldest 46°. The lowest point to which the thermometer fell was 41° 5., and occasionally, in the middle of the day, it rose to 69° or 70°. Yet, with this elevated temperature, almost every beetle, several genera of spiders, &c. &c., were all lying torpid beneath stones. But we have seen that at Bahia Blanca, which is four degrees to the southward, and therefore with a climate only a very little colder, this same temperature, with a rather less extreme heat, was sufficient to awake all orders of animated beings. This shows how nicely the required degree of stimulus is adapted to the general climate of the place, and how little it depends on absolute temperature. It is well known that within the tropics, the hybernation, or, more properly, estivation, of animals is governed by the times of drought. Near Rio de Janeiro I was at first surprised to observe, that, a few days after some little depressions had been changed into pools of water by the rain, they were peopled by numerous full-grown shells and beetles."

Without, therefore, attempting to controvert the opinions of modern naturalists, whose patient and laborious researches demand at least a suspension of judgment on the part of the ignorant, let us hear what some of older date have said on this interesting subject.

Pliny says of the ants—"They remember—they are not without care and forecast. Looke what seedes or grain they lay up for provision—sure they will be to gnaw it first, for fear they should sproute and take root again, and so grow out of the earth. If a corn or seed be too big for their carriage, they divide it into pieces, that they may go with it more easily into their house. If their seeds within chance to take wet, they lay them abroad, and so drie them. They give not over work by night when the moone is at the full, but when she is in the change, they rest, and play them. When they are at work, how painfull are they! how busy, how industrious! And for as much as they make their purveyance in divers places, and bring from all parts, without knowledge one of the other, they keep among them certain market daies, for a mutuall interview and conference together. And verily, it is a world to see, how then they will assemble; what running, what greeting, what intercourse and communication there is between them, whiles they are inquisitive as they meet one with another. What newes abroad: even like merchants at a burse: their warfare is so ordinary and continual, that we may see the very hard flints and pebble stones worn with their passage too and frowe: we may see (I say) a very pathway made where they are to goe about their worke: *whereby let no man doubt of what force and power continual use is, of any thing whatsoever, be it never so little.*"

"The name of this minute insect in Hebrew," says Dr. Paxton, "is *newala,* from a root which signifies to cut down; perhaps because the God of nature has taught it to divide or cut off the top of the grain, which it lays up in its subterraneous cells for the winter, to prevent their germination. This operation is attested by numerous ancient writers, among whom we observe the celebrated names of Pliny and Plutarch. It is at least certain, that the ant cuts off the tops of growing corn that it may seize upon the grain, which may perhaps be the true reason of its Hebrew name. The allusions made to this little animal in the sacred writings, although not numerous, are by no means unimportant. The wisest man refers us to the bright example of its foresight and activity. 'Go to the ant, thou sluggard, consider her ways, and be wise: which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest.' Their uniform care and promptitude in improving every moment as it passes; the admirable order in which they proceed to the scene of action; the perfect harmony which reigns in their bands; the eagerness which they discover in running to the assistance of the weak or the fatigued; the readiness with which those that have no burden yield the way to their fellows that bear under their loads, or, when the grain happens to be too heavy, cut it in two, and take the half upon their own shoulders furnish a striking example of industry, benevolence, and concord to the human family. Nor should the skill and vigour which they display in digging under ground, in building their houses, and in constructing their cells; in filling their granaries with corn for the winter; in piercing channels for carrying off the rain; in bringing forth their hidden stores which are in danger of spoiling by the moisture, and exposing them to the sun and air, be passed over in silence. These, and many other operations, clearly show how instructive a teacher is the ant, even to men of understanding; and how much reason Solomon had to hold up its shining example to their imitation. 'Go to the ant, thou sluggard, consider her ways;'—not that thou mayest become learned, but wise, and especially wise in working out thy salvation, laying up durable riches while the season of mercy continues, providing for that state of never-ending duration when, as the Saviour himself avers, 'no man can work.'"

We find another allusion to the ant near the close of the same book. "The ants are a people not strong, yet they prepare their meat in summer." The superior wisdom of the ant has been recognised by many writers. Horace praises its sagacity:

> "Parvula nam exemplo est magni formica laboris,
> Ore trahit quodcunque potest atque addit acervo,
> Quem struit, haud ignara ac non incauta futuri."—Hor.

Virgil celebrates its foresight, in providing for the wants and infirmities of old age, while it is young and vigorous:

> "Atque inopi metuens formica senectæ."—*Geor.* b. i. l. 186.

And we learn from Hesiod, that among the earliest Greeks it was called *idris,* that is, wise, because it foresaw the coming storm and the inauspicious day, and collected her store. Aristotle observes, that some of those animals which have no blood possess more intelligence and sagacity than some that have blood; among which are the bees and the ants. Cicero believed that the ant is not only furnished with senses, but also with mind, reason, and memory: "In formicâ non modo sensus sed etiam mens, ratio, memoria."

They are called in the Proverbs, gregarious, living in state of society, though without any king or leader t maintain order and superintend their affairs. Th term "people" is frequently applied to them by ancien writers.

Apuleius, describing the manner in which the ants convoke an assembly of the nations, says, that when the signal is given, " Ruunt aliæ superque aliæ sepedum populorum undæ."

All the species of ants known in this country are gregarious, and, like the bees, consist of males, females, and neuters, of which the latter are alone the labourers. These build in the ground an oblong nest, in which there are various passages and apartments. In the formation of this nest every individual is occupied: some are employed in securing a firm and durable groundwork, by mixing the earth with a sort of glue produced in their bodies; others collect little bits of twigs to serve as rafters, which they place over their passages, to support the covering; others again lay pieces across these, and place on them rushes, reeds, and dried grass. The latter they secure so firmly, as completely to turn off the water from their magazines.

They always select sunny but not too dry places to lay the foundations of their nests, but they uniformly avoid moist situations, and give considerable preference to the foot of a hollow tree, or its interior when it has but small accesses. They here labour with considerable industry in laying the foundations of the nest, each assisting the other, and in the course of a few days we perceive a structure rise, having several outlets. If the nest be upon the ground, there are generally affiliated colonies in its vicinity, which are in a constant animated intercourse with the parent state. This intercourse is facilitated by the construction of particular roads, which in a loose soil are tolerably deeply furrowed; and upon these roads we observe innumerable visitors incessantly coming to and fro. All the obstructions that may here interrupt them are removed, each lends its assistance; and if there be at first too few for the purpose, by means of signs they urge other comrades to participate in the labour. Along these roads, they convey into the dwelling the food for the larvæ, which consists of captured insects, caterpillars, small earth-worms, and other, mostly animal, substances. We have said that ants possess the faculty of communicating their views to their comrades; all that requires the labour of many immediately occupies several; and to this participation they urge each other.

Dear children, are they not then a beautiful example for you? Do not the Creator's works here speak the same lessons as His word? "Let us consider one another to provoke unto love and to good works. Bear ye one another's burdens, and so fulfil the law of Christ."

A gentleman of Cambridge observed one day an ant dragging along what, with respect to its strength, might be denominated a piece of timber. Others were severally employed, each in its own way. Presently the little creature came to an ascent, where the weight of the wood seemed for a while to overpower him. He did not remain long perplexed with it; for three or four others, observing his dilemma, came behind and pushed it up. As soon, however, as he had got it on level ground, they left it to his care, and went to their own work. The piece he was drawing happened to be considerably thicker at one end than the other. This soon threw the poor fellow into a fresh difficulty—he unluckily dragged it between two bits of wood. After several fruitless efforts, finding it would not go through, he adopted the only mode that even a man in similar circumstances could have taken: he came behind it, pulled it back again, and turned it on its edge, then running again to the other end, it passed through without the least difficulty.

The same gentleman says, that sitting one day after dinner in the garden of his college, he was surprised by remarking a single ant busily employed in some work that caused him to make many journeys to and from the same place. This gentleman traced him to the entrance of the habitation of a community, from which he observed him take the dead body of an ant in his fangs, and run away with it. He carried it to a certain distance, dropped it, and returned for another, which, by the time of his arrival, was brought to the same hole. This work was continued so long as the gentleman had time to remain near them.

In collecting their stores, these creatures may often be observed in full employment; one of them loaded with a grain of wheat, another with a dead fly, and several together hauling along the body of some larger insects. Whenever they meet with any food too large to admit of being dragged away, they devour so much of it on the spot as to reduce it to a bulk sufficiently small for them to carry.

In all their excursions they have some object in view; and they very seldom return to the nest without either themselves bearing something, or without news that something of use has been discovered, in which joint assistance is necessary. If information is brought that a piece of sugar, or bread, or any kind of fruit, has been discovered, even in the highest story of a house, they range themselves in a line, and follow their leader to the spot.

Ants generally lay up a quantity of different kinds of grain; but to prevent this from taking root, from the moisture of their cells, they instinctively bite off that end from which the blade is produced. From their eggs, the larvæ, a small kind of maggot without legs, are hatched; which soon transform into white chrysalis. The latter are generally called ants' eggs, and are frequently used in the feeding of young pheasants, partridges, and nightingales.

When a nest is disturbed, the ants, with great care, collect all the young that are unhurt, and form a nest for them again. In their confusion they carry off the eggs and larvæ indiscriminately; but as soon as quietness is restored among them, these are carefully separated, and each kind lodged in its own appropriate place. During the warm season of the year, they bring up the maggots nearly to the surface every morning, so that from ten in the morning till about five in the afternoon, these may always be found lodged just under the surface of the ground; and if their hills be examined towards eight in the evening, they will be found to have carried them all down. But if rainy weather be coming on, it will even be necessary to dig a foot or two deeper than usual to find them.

In the last change, the little creature tears its transparent veil, and then bursts into life a perfect insect; destitute of wings if a neuter, and winged if male or female. The winged insects are also known by a small erect scale placed on the thread which connects the body and thorax.

The males are much smaller than the females, and seldom frequent the common habitation. All the labour the females undergo is in the laying of eggs.

Ants frequently swarm on trees, where they have been supposed to do much injury, but this seems a very unjust charge against them; for in Switzerland, they are even compelled to remain in the trees, in order to destroy the caterpillars. This is done by hanging a pouch full of ants upon a tree, the root of which is smeared with wet clay or pitch, to prevent their escape; in consequence of this, they are soon compelled by hunger to seize upon the caterpillars and devour them. When the female is acknowledged as a mother, the workers begin to pay her a homage very similar to that which the bees render to their queen.

All press round her, offer her food, conduct her by her mandibles through the difficult or steep passages of the nest; nay, they sometimes even carry her about their city. She is then suspended upon their jaws, the ends of which are crossed; and being coiled up like the tongue of a butterfly, she is packed so close as to incommode the carrier but little. When she sets her down, others surround and caress her, one after another tapping her on the head with their antennæ.

"In whatever apartment," says Gould, "a queen condescends to be present, she commands obedience and respect. An universal gladness spreads itself through the whole cell, which is expressed by particular acts of joy and exultation. They have a particular way of skipping, leaping, and standing upon their hind legs, and prancing with the others. These frolics they make use of both to congratulate each other when they meet, and to show their regard for the queen; some of them gently walk over her, others dance round her; she is generally encircled with a cluster of attendants, who, if you separate them from her, soon collect themselves into a body, and place her in the midst. Nay, even if she dies, as if they were unwilling to believe it, they continue sometimes for months the same attentions to her, and treat her with the same courtly formality as if she were alive, and they will brush her, and lick her incessantly.

Huber says, that the eggs of ants grow after being laid, a circumstance favoured probably by the moist situation in which the workers are always careful to keep them.

The feeding of the young brood, which rests solely on the working ants, is no small charge. The nest is constantly stored with larvæ the year round, during all which time, except in winter, when the whole society is torpid, they require feeding several times a-day with a viscid half-digested fluid that the workers disgorge into their mouths, which, when hungry, they stretch out, to meet those of their nurses. Add to which, that in an old nest there are generally two distinct broods of different ages, requiring separate attention; and that the observations of Huber make it probable that at one period they require a more substantial food than at another. It is true that the youngest brood at first want but little nutriment, but when we consider that they must not be neglected, that the older brood demand incessant supplies, and in a well-stocked nest amount to seven or eight thousand; and that the task of satisfying all these cravings, as well as providing for their own subsistence, falls to the lot of the working ants, we are almost ready to regard the burden as greater than can be borne by such minute agents; and we shall not wonder at the incessant activity with which we see them foraging on every side. Well may we be told to "consider her ways:" for, like the other works of our Divine Creator, they are most wonderful. It is necessary that the larvæ should be kept extremely clean; and for this purpose, the ants are perpetually passing their tongue and mandibles over their body, rendering them by this means perfectly white. After the young grubs have attained their full growth, they surround themselves with a silken cocoon, and become pupæ, which, food excepted, require as much attention as in the larva state. Every morning they are transported from the bottom of the nest to the surface, and every evening returned to their former quarters; and if, as is often the case, the nest be thrown into ruins by the unlucky foot of a passing animal, in addition to all these daily and hourly avocations, is superadded the immediate necessity of collecting the pupæ from the earth with which they have been mixed, and of restoring the nest to its pristine state. Nothing can be more curious than the view of the interior of a fully peopled ant's nest in summer. In one part are stored the eggs; in another the pupæ are heaped up by hundreds in spacious apartments; and in a third we see the larvæ surrounded by the workers, some of which feed them, while others keep guard, standing erect upon their hind legs with their abdomen elevated in the position for ejaculating their acid, than which gunpowder would not be more formidable to the majority of their foes. Some again are occupied in clearing the alleys from obstructions of various kinds; and others rest in perfect repose, recruiting their strength for new labours.

Mr. Latrulle relates that some ants, on witnessing the sufferings of their companions, whose antennæ he had cut off, dropped from their mouth, upon the wounded part, a little transparent liquor, of which they knew perhaps the full virtue.

The solicitude of ants for their young, and the care they take in transporting them from place to place, has not been overstated. The working ants know, it is said, the precise degree of heat which their health requires; and never fail to bring the young ones to the surface when the warmth of the atmosphere is propitious, or to bring them deeper according to the progress of the cold. As soon as these larvæ are hatched, the parent ant begins to bring in the *débris* of dead bodies found by the way, or sometimes drags a straggling worm into the fatal shambles, when it is divided, and accurately apportioned to each in equal rations; the elder members of the community never touching food till the younger ones have been fed, and are satisfied. It is observed, when one of the labourers is accidentally wounded at his work, he is assisted by the others, and taken to the hospital; but if his case be evidently past the skill of surgery, his body is thrown away among the rubbish of the nest. For a particular instance of the sagacity of ants, the following may be related:—"A wall had been erected with the view of sustaining a vaulted ceiling, still incomplete; the ants who had begun constructing it had given it too little elevation to meet the opposite partition, upon which it was to rest. Had it been continued on the original plan, it must infallibly have met the wall at about one half of its height, and this it was necessary to avoid. This state of things very forcibly claimed attention, when one of the ants arriving at the place, and visiting the works, seemed to be struck by the difficulty which presented itself, and immediately obviated it by taking down the ceiling, and raising the wall on which it had reposed: it then constructed a new ceiling with the fragments of the former one."

The quality of perseverance in ants, on one occasion led to very important results, which affected a large portion of this habitable globe; for the celebrated conqueror Timour, being once forced to take shelter from his enemies in a ruined building, where he sat alone many hours, desirous of diverting his mind from his hopeless condition, fixed his observation upon an ant that was carrying a grain of corn (probably a pupa) larger than itself up a high wall; numbering the efforts that it made to accomplish this object, he found that the grain fell sixty-nine times to the ground, but the seventieth time it reached the top of the wall. "This sight," said Timour, "gave me courage at the moment; and I have never forgotten the lesson it conveyed."

There is a very affecting example of the self-denial and self-devotion of these admirable creatures. When the female ant loses her companion, the widowed bride seeks only how she may provide for their mutual offspring. Panting no more to join the choir of aërial dancers, her only thought is to construct a subterranean abode, in which she may deposit and attend to her eggs, and cherish her embryo young, till, having passed through their various changes, they arrive at their perfect state, and she can devolve upon them a portion of her maternal cares. Her ample wings, which before were her chief ornament, are now an incumbrance, which incommode her in the fulfilment of the great duty uppermost in her mind; she therefore, without a moment's hesitation, plucks them from her shoulders. Might we not then say, "go to the ant, ye mothers, consider her ways and be wise."

These creatures, and their interesting habits, have something so much bordering upon the marvellous, that many persons have been induced to discredit much which has been published upon the subject; but, singular as their history appears, every day's observation proves that much more might be written on their instinctive carefulness and extraordinary sagacity. A gooseberry bush was observed to be infested with *Aphides*,* whilst a number of black ants were seen actively employed upon its leaves and fruit. On a closer examination they were discovered to be constructing mud roofs, or archways, from the stem of the plant to some of the fruit, leaving a part of the same uncovered. Within this dome, or archway, a small flock of aphides were studiously retained by the ants. Thus sheltered from the rain, which had fallen abundantly, they nourished themselves, and afforded their sagacious shepherds that honey-dew which it is well known they seek with so much assiduity. Over some of these archways they had carefully glued a leaf of the tree, so disposed that the rain might easily glide off, and thus the mud roof was rendered impervious to the wet. As a further instance of instinct, the fruits thus erected upon had been chosen, or first ascertained to be firmly fixed between two of the spines, or confined by the leaves and branches of the trees. Linnaeus truly called the aphides the cows of the ants.

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* The *aphides*, or plant-lice, are an extensive genus, and, owing to their great multitudes, prove one of the most pernicious tribes of the insect race to the vegetable kingdom. They are commonly known by the terms of green fly, smother fly, and sometimes, and more properly, plant lice. So productive is this tribe of insects, that Reaumur has proved that, in five generations, one aphis may be progenitor of 5,900,900,000 descendants, and that in one year there may be twenty generations. He also observes that, at the time of emigration, these great enemies of vegetation are sometimes so numerous as to darken the air. When they prevail to a great extent the gracious Creator generally sends other armies calculated to subdue their depredations. This has been often the case with the lady-bird or coccinella. These little warriors attack and effectually repulse them. Another destroyer of

That ants should have their milch cattle is as extraordinary as that they should have slaves. The loves of

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the aphides is the larva of the *musca pyrestri* or fly. Several kinds of birds are also of great service in destroying these pernicious insects. Some say that ants are also inimical to them, but most naturalists now seem to agree in Mons. Huber's curious discovery, and to confirm his observations by their own.

the ants and the aphides (for these last are the kine in question) have long been celebrated, and that there is a connection between them you may, at any time in the proper season, convince yourself, for you will always find the former very busy on those trees and plants on which the latter abound: and if you examine more closely, you will discover that their object in thus attending upon them is to obtain the saccharine fluid, which may well be denominated their milk, that they secrete. This fluid, which is scarcely inferior to honey in sweetness, issues in limpid drops from the abdomen of these insects, not only by the ordinary passage, but also by two latiform tubes, placed one on each side, just above it. Their sucker being inserted in the tender bark, is, without interruption, employed in absorbing the sap, which, after it has passed through the system, they keep continually discharging by these organs. The ants absolutely possess the art of making them yield their milk at their pleasure; or, in other words, of milking them. On this occasion their antennæ are their fingers: with these they pat the abdomen of the aphis, on each side alternately, moving them very briskly; a little drop of fluid immediately appears, which the ant takes into its mouth, one species, *myrmica rubra,* conducting it with its antennæ, which are somewhat swelled at the end. When it has thus milked one, it proceeds to another, and so on, till, being satiated, it returns to the nest.

Not only the aphides yield this respect to the ants, but also the cocci, with whom they have recourse to similar manœuvres, and with equal success; only, in this case, the movement of the antennæ over their body may be compared to the thrill of the finger over the keys of a pianoforte.

But the most singular part of this history is this—that ants make a property of these cows, for the possession of which they contend with great earnestness, and use every means to keep them to themselves. Sometimes they seem to claim a right to the aphides that inhabit the branches of a tree or the stalks of a plant; and if stranger ants attempt to share their treasure with them, they endeavour to drive them away, and may be seen running about in a great bustle, and exhibiting every symptom of inquietude and anger. Sometimes, to rescue them from their rivals, they take their aphides in their mouth; they generally keep guard round them, and when the branch is conveniently situated, they have recourse to an expedient still more effectual to keep off interlopers. They inclose it in a tube of earth or other materials, and thus confine them in a kind of paddock near their nest, and often communicating with it. The greatest cow-keeper of all the ants, is one to be met with in most of our pastures, residing in hemispherical formicaries, which are sometimes of considerable diameter—I mean the *formica flava,* or yellow ant. This species, which is not fond of roaming from home, and likes to have all its conveniencies within reach, usually collects in its nest a large herd of a kind of aphides that derives its nutriment from the roots of grass and other plants (aphis radicum); these it transports from the neighbouring roots, probably by subterranean galleries, excavated for the purpose, leading from the nest in all directions; and thus, without going out, it has always at hand a copious supply of food. These creatures share its care and solicitude equally with its own offspring; to the eggs it pays particular attention, moistening them with its tongue, carrying them in its mouth with the utmost tenderness, and giving them the advantage of the sun. This last fact I state from my own observation; for once, upon opening one of these ant-hills early in the spring, on a sunny day, I observed a parcel of these eggs, which I knew by their black colour, very near the surface of the nest. My attack put the ants in a great ferment, and they immediately began to carry these interesting objects down into the interior of the nest. It is of great consequence to them to forward the hatching of these eggs as much as possible, in order to ensure an early source of food for their colony; and they had doubtless, in this instance, brought them up to the warmest part of their dwelling with this view.

The flava, or yellow ants, are equally careful of their aphides after they are hatched, when their nest is disturbed, conveying them into the interior; fighting fiercely for them, if the inhabitants of neighbouring formicaries, as is sometimes the case, attempt to make them their prey; and carrying them about in their mouths to change their posture, or for some other purpose. When you consider that from them they receive almost the whole nutriment both of themselves and larvæ, their anxiety about them is not to be wondered at, since the wealth and prosperity of the community is in proportion to the number of their cattle.

Those little yellow ants that are in possession of the aphides, serve the purpose of a compass to the mountaineers, when they are enshrouded in thick fogs, or have lost their way during the night. Their habitations, which are more common and more elevated in mountains than elsewhere, take an oblong and almost regular shape. They lie in a direction east and west; their summit, and the greatest slope, always faces the east; but they incline also on the opposite side. "I have verified," says Mr. P. Huber, "upon thousands of these ant-hills, this observation of the shepherds. I found a trifling number of exceptions; but only in those instances where these hillocks had been deranged by men, or other animals. They do not preserve this form in the plains, where they are more exposed to such accidents." One year, on the 3rd of March, an English labourer being employed in cutting up ant-hills, or lumps, as we call them, exposed to view multitudes of the yellow species (flava) in their winter's retirement. They were collected in numbers in little cells and compartments, communicating with others by means of narrow passages. In many of their cells they had deposited their larvæ, which they were surrounding and attending, but not brooding over or covering. Being disturbed by our rude operations, they removed them from our sight to more hidden compartments. The larvæ were small. Some of these ant-hills contained multitudes of the young of the wood-louse (coniscus armadillo), inhabiting with perfect familiarity the same compartments as the ants, crawling about with great activity with them, and perfectly domesticated with each other. They were small and white; but the constant vibration of their antennæ, and the alacrity of their motions, manifested a healthy vigour. Mr. Huber says, that besides the wood-lice, there are several other insects which live among ants; although, he adds, they do not appear to be of any service to them. It has, however, been suggested, that as wood-lice are very skilful miners, they may be found useful in that capacity; and Mr. Huber's own wonderful researches appear to me to throw much of the necessary light on those words of Scripture—"they *provide* their *meat* in the summer;" for although he tells us that "he has relinquished the opinion that they amass wheat and other grain, and that they gnaw the corn to hinder it from germinating," yet, from the fact of those insects, which Huber calls their cattle, living in such close neighbourhood with them all the year round, may it not be said that these minister to their wants, and that ants provide for such an "*entourage;*" since the aphides become torpid at precisely the same degree of cold as the ants, and recover from this state also at the same time: the ants, therefore, always find their cattle when they need them; and may they not then jointly be styled "provident"?

When Mr. Huber took some of the yellow ants, together with the little aphis, of whom they take as tender a charge as of their own offspring, and when he knew that this insect was one belonging to the oak, he placed them near some branches of that tree, when they set immediately about sucking the juice from them; and, says he, the ants now formed within their reach a recompence for their care and attention.

The world may perhaps sneer at the kindly and tender care which Christian guardians and masters bestow on the young, the helpless, the orphan, the stranger, and, many times, those condemned by that world: but there *shall* be a recompence, perhaps even in this life, but most certainly in that which is to come. Oh! early, then, dear children, enlist your interests on the side of the helpless, of the infirm, and of the stranger. Fear not, little flock, ye shall in no wise lose your reward.

It has been noticed as a singular fact, that the rose beetle has been found not unfrequently, while in its two first stages of existence, the tenant of an ant hill; and that without being attacked by its carnivorous inhabitants. It is hence called, in some countries, "king of the ants;" and it is said also, that German cattle-dealers invest it with supernatural powers, and feed it carefully in boxes, as a means of ensuring prosperity to their herds and pastures. Had the above superstition been Irish, instead of German, it might have been readily enough explained: ant-hills were formerly, if they are not still, called in Ireland, "fairy mounts," and held as such in profound veneration by the common people, who feared to disturb one of them, lest they should incur the vengeance of the fairies. The rose chafer's apparent sovereignty over the ant-hill, would have naturally therefore invested him, in Hibernian eyes, with the dignity of king of fays, and have made him, in consequence, an object of propitiatory homage.

Some writers are of opinion that many species of ants do not remain torpid during winter. "During the frosts of 1829-30," says one, "we opened two nests of the yellow ant (*formica flava*), in which we found the inhabitants by no means torpid or inactive, although not so lively as in summer; but these nests were in a peculiarly warm situation, being both in the old trunks of willows, rendered quite spongy by the dry rot, and facing the south-west, where they had the benefit of every glimpse of sunshine. We searched with great minuteness for the eggs of the aphides mentioned by Huber, but without success; and we cannot account for their means of subsistence, unless they fed on the various insects and crustaceous animals which abounded in the trees. They were also, in both instances, within a yard of a stream of water, to the vicinity of which we have observed that this species is partial; and it is not improbable that it may form an indispensable part of their subsistence. No species of ants, indeed, can live without drinking. In February of the same year, immediately after the breaking up of the first frost, we also observed numbers of the small black ant (*formica fusca*) running about the sunny sides of hedge banks; and though we did not trace them to their winter quarters, we think it not improbable, from their very early appearance, that they had never been completely torpid. It is observable how, upon a breaking up of their banks, they make it their business immediately to carry their young out of sight again, laying the several sorts of them in several places and heaps; the which, if you mingle again, or scatter, you shall, laying out some bits of slate, or the like, in any place they may come to and get under, after a few hours see all the vermicals, vulgarly called eggs, laid in their several and distinct parcels, under such pieces of slate, &c. . . . . I have observed in summer, that in the morning they bring up those of their young (that are vulgarly called ants' eggs) towards the top of the bank; so that you may, from ten in the morning until five or six afternoon, find them near the top, especially about one, two, or three of the clock, and later, if the weather be hot; when, for the most part, they are found on the north side of the bank. But, towards seven or eight at night, if it be cool, or likely to rain, you may dig a foot deep before you can find them. A working ant has been known to drag ten pupæ into a place of security after the posterior part of its body was cut off. The Russian shepherds ingeniously avail themselves of the attachment of ants to their young, for obtaining, with little trouble, a collection of the pupæ, which they sell as a dainty food for nightingales. They scatter an ant's nest upon a dry plot of ground, surrounded with a shallow trench of water, and place on one side of it a few fir branches. Under these the ants, having no other alternative, carefully arrange all their pupæ, and in an hour or two the shepherd finds a large heap clean and ready for market. Nor are the pleasures of ant-eating confined to nightingales or other birds. We are told that a very grateful acid is procured from ants by distillation: the quantity of acid contained in them exceeds what is found in any other part of the animal creation. These insects exhale the acid whether irritated or not, so that the same changes produced on flowers by known acids, take place when they are laid in the track of ants; and it has been conjectured that part of the irritation caused by their bite is produced by the insertion of a portion of their native acid. From their agreeable sour flavour they are eaten by several Brazilian tribes. There are a yellow kind, as also a larger species, bearing the name of *Terma-joura.* This is confirmed by Humboldt, who informs us that ants are eaten by the *Marivefanos* and *Margrecirtans,* mixed with resin for sauce. In some parts of Sweden ants are distilled along with rye, to give a flavour to the inferior sorts of brandy.

Mr. Consett tells us an instance of a person being fond of eating them alive. Walking one day with a young gentleman in a wood near Gottenburg, he says he observed him sit down on an ant-hill, and, with a great degree of pleasure, devour these insects, first nipping off their heads and wings. The flavour, according to his account, was an acid somewhat resembling, though much more agreeable than, that of a lemon. In some parts of the East Indies the natives make two holes in the nests of the white ants, one to the windward and the other to the leeward, placing at the latter opening a pot rubbed with an aromatic herb, to receive the insects driven out of their nests by a fire of ill-savoured materials made at the former. Thus they catch great quantities, of which they make with flour a variety of pastry, that they can afford to sell cheap to the poorer people. The Africans are not so ingenious in procuring or dressing them. They are content with a very small part of those that fall into the waters at the time of swarming, which they skim off with *calabashes;* bring large kettles full of them to their habitations, and parch them in iron pots over a gentle fire, stirring them about as is done in roasting coffee. In that state, without sauce or other addition, they serve them up as delicious food, and eat them by handsful, as we do comfits. Mr. Smeathman has eaten them dressed in this way several times, and thought them delicate, nourishing, and wholesome, being sweeter than the grub of *Curculio Calandra Palmarum,* which is served up at all the luxurious tables of the West Indian epicures, particularly of the French, as the greatest dainty of the western world. When their corn is consumed, many of the Hottentots are reduced to the necessity of feeding upon the eggs of white ants, which in this part of the country make their nests in holes in the ground. The Hottentots here call these eggs rice, on account of their resemblance to that grain; they usually wash them, and cook them with a small quantity of water;

they are said to be palatable. If the people find a place where the nests are numerous, they soon become fat upon the eggs, even when previously much reduced by hunger. Sometimes they will get half a bushel of eggs out of one nest. At the Cape, farmers collect them by bushels, for the purpose of fattening poultry.

The great black ant (*formica fuliginosa*) is commonly found in all little copses, animating, by its numbers, those large heaps of vegetable fragments which it collects, and is constantly increasing with unwearied industry and perseverance, as a receptacle for its eggs. The game fowl, the woodpecker, the wryneck, and all the birds that feed upon the little red ant, and soon depopulate the hillocks which they select, do not seem equally to annoy this larger species. These systematic creatures appear always to travel from, and return to, their nests in direct lines, from which no trifling obstacle will divert them; and any interruption on this public highway they resent, menacing the intruder with their vengeance. Two parties of these black ants were proceeding from different nests upon a foraging expedition, when the separate bodies happened to meet each other; neither would give way, and a violent contest for the passage ensued. After a time the combat ceased, and all animosity subsided, each party retiring to its nest, carrying with it its dead and maimed companions. This encounter seemed quite accidental, and the disposition to move in a uniform line, which their meeting prevented, the sole cause of their hostility, combat, and mutual injury.

The warlike and predatory excursions which *formica rufescens,* called by Huber amazons, and *formica sanguinea,* undertake upon losing their young progeny of neuters, are most remarkable. They proceed in hosts to the nest of other ants, master its entrances, and convey away their young. These then grow up as helots in the foreign community, execute all the labour necessary for the advance and preservation of the state; they seek food, increase the building, sun the larvæ and pupæ, convey them back into the nest, and assemble with their subduers without recalling their disgrace. Thus originate the variously coloured and intermixed communities. Not the least wonderful circumstance connected with these insect battles, is the instinct which enables each ant to know its own party; more particularly, when the combatants on both sides are of the same species, and thousands of individuals mingle in the strife, who appear, at least to our senses, to be precisely alike in shape, size, and colour; sometimes, indeed, according to Huber, they do attack those of their own party, but on recognising them, immediately relax their hold; while it often happens that the individuals who have been the sufferers from this temporary error, caress their companions, for the purpose, it would appear, of appeasing their anger. The warfare, however, is conducted in various manners, according to the genius of the species engaged in it; and when a party of the *formica rufa,* or wood ant, attacks a party of the *formica sanguinea,* sanguine ant, the manœuvring reminds us strongly of our own battles. The sanguine ants, in this case, go and await the enemy in little troops at some distance from the nest; advancing in a body without separating, and seize all those of their enemies who venture too far from the camp. "The two parties," says Huber, "place themselves in ambuscade, and suddenly attack each other in turns; but when the sanguine ants perceive that the wood ants are advancing in force against them, they inform those at the ant-hill, by messengers, of the need in which they stand of their assistance. Immediately a considerable army is despatched from the sanguine city, advances in a body, and surrounds the enemy.

Contiguity is not always the cause of such warfares; for different species often live in the same hedge, and with their boundary walls almost touching each other, without any appearance of hostility. Sometimes, colonies of three different species have been found established under the same stone; the yellow ant, the negro, and the red ant (*ruba*) were seen thus together, although the latter is most pugnacious perhaps, and certainly the most virulent of the whole tribe. Yet all the three were living in harmony, though the stone which served them as a common covering was not a foot in diameter. Even in this case, however, it was by no means safe for an individual to cross its own boundaries, and venture into its neighbour's territory; and if one be forced to encroach in this way, it always scampers off with the utmost trepidation, as if well aware, without consulting Vattel or Puffendorf, of having infringed an international law.

The manner in which communities of ants obtain labourers is most extraordinary. Willoughby, Gould, and White of Selborne, had made some observations on these wonderful proceedings; but it was reserved for the patiently-exploring Huber to make the observation good, and his testimony is confirmed by Professors Juive and Latreille. Columns of legionary ants, say the amazons, quit their own nests, and proceeding, in spite of all obstructions, in an unbroken column, approach the nest. On discovering the aggression, these dart forth on the advancing legion. The alarm spreads in the interior of the nest, whence their companions rush out in multitudes to defend their homes. The bulk of the army, which remains a short distance behind, quicken their march, and fall on the enemy, who take refuge, after a desperate conflict, in their subterranean galleries. The legionaries now ascend the dome of the nest, leaving some of their companions to make a breach and excavate other openings. This being soon effected, the remainder of the army make their entrance, and soon after issue forth, each carrying off a pupa or a grub, with which booty they retrace their route, in a straggling irregular march, very different from the close orderly array they have before exhibited.

One of the most remarkable circumstances discovered by Huber respecting the expeditions for capturing slaves, is that the invaders never capture the old negroes or miners, aware, it should seem, of the impracticability of taming them down to the condition of slaves. Their only object is to obtain a number of pupæ, when the embryo-ants are in a state of repose, and consequently have formed no attachment to their natal colony. The city of the stranger thus becoming the only one with which they are acquainted, they consider it their home, and employ their natural activity in repairing and enlarging it, as well as adding to its original stores; putting forth, in a word, the same exertions which they would have done had they never been captured. "Developed," says Huber, "in the enemy's encampment, they afterwards become house stewards and auxiliaries to the tribe with whom they are associated. Not only do they live socially with their captors, but bestow the greatest care on their larvæ and pupæ, and even evince the same regard for themselves, going in search of provisions for them, and fulfilling the duties of sentinels by guarding the exterior of their common abode, apparently not once suspecting that they live with those very insects which kidnapped them in their helpless and unconscious infancy."

The nest of the large red ants (*rufa*) which are common in woods, at the first aspect seems a very confused mass. Externally, it is a conical mount, composed of pieces of straw, fragments of wood, little stones, leaves, grain; in short, of any portable materials within their reach. But however rude its outward appearance, and the articles of which it consists, internally it presents an arrangement admirably calculated at once for a protection against the excessive heat of the sun, and yet to retain a due proportion of genial warmth. It is wholly composed of numerous small apartments of different sizes, communicating with each other by means of galleries, and arranged in separate stories, some very deep in the earth, others a considerable height above it; the former for the reception of the young in cold weather and at night, the latter adapted to their use in the daytime. In forming these, the ants mix the earth excavated from the bottom of the nest with the other materials of which the mount consists, and thus give solidity to the whole. Besides the avenues which join the apartments together, other galleries, varying in dimensions, communicate with the outside of the nest at the top of the mount. These open doors would seem ill calculated for precluding the admission of wet or of nocturnal enemies; but the ants alter their dimensions continually, according to circumstances; and they wholly close them at night, when all gradually retire to the interior, and a few sentinels only are left beyond the gates. On rainy days, too, they keep them shut, and when the sky is cloudy open them partially. The habitations of these ants are much larger than those of any other species in this country, and sometimes as big as a small haycock; but they are mere molehills, when compared with the enormous mounds which other species, apparently of the same family, but much larger, construct in warmer climates.

The fallow ant is that which forms in the woods those hillocks so remarkable for their extent. It admits of easy observation, from it being above the middle size, from its operations being carried on in open day, and from the simplicity of the work in which we find it engaged. It is very common in every part of Europe. The fallow ants stand high on their legs. Their head, which is larger than the corslet, is of a pale red or yellow colour at the extremity, and blackish at the top. The mouth is armed with two very strong mandibles, which they generally keep apart, and make use of, not only for attacking their enemies and taking their prey, but in carrying burthens, and performing the labours and reparations of the ant-hill. There are two varieties of these ants, the one with a black back, the other with a back of the same colour as the rest of the corslet. This distinguishes those who inhabit the woods from those who live alongside hedges or in meadows. The wood ants prefer living in the open air, and do not hesitate carrying on, in the presence of man, the greater part of their operations. As night approaches they generally lessen the approaches of their spacious avenues to the doors of their dwellings. The aperture, at length, totally disappears. The dome is closed on all sides, and the ants retire to the bottom of their nests. In the morning the blockades are removed, and they renew their labours. This opening and closing of their nests occupy them several hours. When the sky is cloudy, or if it rains, the avenues are but partially opened.

Truly may we pause and wonder at the surprising intelligence of these little creatures, and ask ourselves, since the knowledge and worship of so gracious and glorious a Creator is all the superiority which man has over the creatures which he tramples under his feet, what advances are we making in this knowledge? What do we more than others to testify our love to so kind a Father?

The red ant is of inferior size to the common ant; it has a very small head, and a broad breast in proportion to its body. The scale is slightly dentated and nearly circular; the legs are slender; the wings extremely fine, and of a brownish hue. It frequents dry pastures, and is often found on the leaves and stalks of the humbler plants.

The habits and manners of the common black ant, *nigra,* and those of the *fusca,* or ash-coloured ant, are said to be almost precisely the same. They build after the same manner. They open the cocoons of their pupæ a few days after they have spun, under the form of larvæ, and are all equally exposed to the invasion of the amazon ants.

The black ant is of a middle size, between the horse and the red species. Its head is large in proportion to its body. The scale is of an oval shape, having its edges entire; and the legs are longer and more slender than in the other species. This ant abounds in heaths and large dry plains.

The horse ant is the largest species found in Great Britain, being twice the magnitude of the common sort. It is not only distinguished by its size, but by the blackness of its head, and the dusky iron-grey of its breast. Its legs are also an iron-grey, and the scale between the body and the breast is of an oval figure, pointed at the top and undivided. The body is entirely brown, and composed of five segments. This species generally harbours in hollow trees, but in its ordinary habits differs little from the rest of the genus.

The musk ant is the name given by Lister and Ray to a peculiar species of ant, which is of the number of the perfumed insects. It is found on dry banks, and so much smaller than the common ant, that it needs no other distinction. Those of this species which are without wings, are of a yellowish colour, and when bruised or crushed, emit a sharp and acid smell, as the common ant does, but those which have wings are coal black, and these, instead of the same smell as the other, emit a perfume, not to be endured for its strength. The smell of the perfumed insects goes off in keeping, and these little creatures, after they have been dead and dry some time, are found to smell less strongly, but much more agreeably.

Many ants, for instance *formica foetus*, and *formica fuliginosa*, exhale a powerful and unpleasant smell, which may, perhaps, be given them as a means of defence, though it also appears to furnish them with the means of following the routes of their companions to and from their encampments. A track of the *formica fusca* or negro ant, was once observed on Hampstead Heath, leading to a numerous colony, and crowded through its whole extent with foragers. By simply drawing a walking stick across this track, in several places, so as to obliterate the scent, the whole train of foragers were instantly thrown into confusion, and wandered about as if blindfold or tipsy, and, during the time they were watched, did not succeed in reuniting the points of the track which had been dispersed, though most of them found their way to the nest by circuitous and zig-zag routes. The track in question was not visibly hollowed out, as Huber says is done by the *formica rufa,* or wood ant, to the extent, sometimes, of a hundred feet in length, and several inches in breadth, or by the emmet, *formica fuliginosa,* which is said to eat the grass in its pathways, but marked solely by the effluvia of the insects. The odour of the wood ants is so powerful that a frog, thrown into one of their encampments, will be suffocated in five minutes. This seems to prove that ants are endowed with an acute sense of smell.

It has been well observed—"Let the wisest man go out of himself, and survey the immense extent of nature, from 'the giant peak of the firm Andes' to 'the bending cup of the minutest flower,' the variety of its works, the regularity of its motions, the harmony of Providence—from the great leviathan, to the minutest insect—and then let him seriously pronounce how little is his own knowledge, how vast his ignorance."

After all the laborious researches of the learned, instinct, as to its *essence,* which is what we want to detect, is as mysterious as ever; just as though we can clearly prove that the mind is acted upon by the senses, yet this throws no light upon the essential nature of the mind, which we are forced to admit is inscrutable; as if to teach us humility, and prevent our vainly fancying that, though allowed to discover some of the arcana of nature, we shall ever be able to penetrate into her inmost sanctuaries. "It is obvious," says Dr. Badham, "that mere sensuous impression cannot determine the conduct of any insect; there must be also another and a higher element in a perception of the end proposed, as well as a knowledge of the means of attaining it. So great, however, are the wonders told by credible witnesses and excellent men, of the intercommunication of bees and ants, that, like a surprising vision, which for a time takes away from the seer the power of challenging or studying what he sees, they at first overcome the mind, and completely aback the spirit of inquiry." The following instance of this faculty in ants is sufficiently surprising for a romance, but stands upon record as an authentic history: A pot of molasses stood in a place infested by ants; the owner, tired of driving them off *pro re nata,* performed one grand act of expulsion on the intruders, and slung the pot up to the ceiling of the room. A single ant, however, escaped his vigilance, and stuck not *in,* but *to* the treacle, from which, after taking as much as he thought good for him, he went his way. To accomplish a retreat there was but one road; ants do not fly; it was necessary for him to crawl up the cord, take to the ceiling, and descend the walls to join his comrades, all of which measures he duly and diligently executed. Shortly after his safe arrival, the whole body of ants was seen leaving its quarters, marching upon the treacle depôt by the self-same course, and descending the same rope ladder into "the happy valley" in which their friend had rioted. No jostling was there; no impeding each other's progress; the fasting went down in one column, the full came up in another, and the vessel was soon licked clean. The above story comes from no less authority than Franklin, as an irrefragable proof of insect intercommunication. . . . . In an Italian forest I once came upon a piece of foot-path, covered for several feet with swarms of ants, evidently occupied in something in which they had a common interest, and it turned out to be war. A detachment of the *formica ruficollis,* which wore a dark uniform with a red collar, was coming forth from the grass in which their encampment lay: they made for a large chesnut-tree, upon which a considerable number of black ants (*formica pubescens*), insects of three times their stature, were posted, and taking measures to receive them. There appeared to be so much ferocity, and so much purpose, in the manœuvres on both sides, that it was impossible not to be interested while looking on. Having stopped some time to observe them, I saw several of the besieged party, as soon as any one of them took a prisoner, carrying him up in his mouth to a Tarpeian height, and then let him drop on the plain below. The red-necked ants, on the other hand, in immense force, completely surrounded the enemy's position, and stood ready with their jaws open to seize any straggler from above, who was sure to meet with no quarter when the fortune of war had placed him in their power. Many of the episodes in this heroic poem were curious enough; and among the most so, were those produced by my interfering, and amusing myself by backing the reluctant, and placing obstacles in the way of the enterprising. Here, while the fact of inter-communication seems strong as possible, its supposed import makes it take a very high character, for

> Communi dare signa tubæ, defendere iisdem,
> Turribus, atque una portarum clavi teneri,—

are privileges which have been hitherto held to be peculiar to man. Mr. Huber observed that when he disturbed those ants (of the *formica herculanea* species) that were at the greatest distance from the nest, they ran towards them, and striking their head against them, communicated their cause of fear or anger; that these, in their turn, conveyed in the same way the intelligence to others, till the whole colony was in a ferment, those neuters which were within the tree, which is their usual habitation, running out in crowds to join their companions in the defence of their habitation. The same signals that excited the courage of the neuters produced fear in the males and females, which, as soon as the news of the danger was thus communicated to them, retreated into the tree as into an asylum.

If you scatter the ruins of an ant's nest in your apartment, you will be furnished with another proof of their language. The ants will take a thousand different paths, each going by itself, to increase the chance of discovery; they will meet and cross each other in all directions, and, perhaps, will wander long before they can find a spot convenient for their reunion. No sooner does any one discover a little chink in the floor, through which it can pass below, than it returns to its companions, and, by means of certain motions of its antennæ, makes some of them comprehend what course they are to pursue to find it, sometimes even accompanying them to the spot; these, in their turn, become the guides of others, till all know which way to direct their steps. It is evident from the whole series of their proceedings, that they feel the full force of the sentiment which we term patriotism, or the love of the community to which they belong. Distress or difficulty falling upon any member of their society, generally excites their sympathy, and they do their utmost to relieve it. Mr. Latreille once cut off the antennæ of an ant, and its companions, evidently pitying its sufferings, anointed the wounded part with a drop of transparent fluid from their mouth.

Dear children, does not creation's voice cry out here, as that of the Holy Spirit doth in God's blessed word, "Be pitiful," "kind, tender-hearted;" and when you hear further, that when a burthen is too heavy for one, another will soon come to ease it of part of the weight, may we not learn also from these little creatures to be "courteous"—true politeness being ever the companion of tender-heartedness. And again: if one be threatened with an attack, all hasten to the spot, to join in repelling it. Truly may we learn from them that charity "seeketh not her own." They are also ever intent to promote each other's welfare, and ready to share with their absent companions any good thing they may meet with. Those that go abroad feed those which remain in the nest, and, if they discover any stock of favourite food, they inform the whole community, and teach them the way to it. Mr. Huber, having produced heat in one part of an artificial formicary, the ants that happened to be in that quarter, after enjoying it for a time, hastened to convey the welcome intelligence to their compatriots, whom they even carried suspended to their jaws, their usual mode of transporting each other, to the spot, till hundreds might be seen thus laden with their friends. Dear children, this is a pleasant remembrancer of that advice of the apostle, "Let no man seek his own, but every man another's wealth."

Their extraordinary and persevering industry was observed by Aristotle, who affirmed that ants worked in the night when the moon was at the full; and Gould observes, "that they even exceed the painful industrious bees, for the ants employ each moment, by day and night, almost without intermission, unless hindered by excessive rains." Mr. Huber, also, speaking of a mason ant, not found with us, tells us that they work after sun-set, and in the night. To these Mr. Hirly adds his own observations, which confirm these accounts. "My first," says he, "were made at nine o'clock at night, when I found the inhabitants of a nest of the red ant, *myrmica rubra*, very busily employed. I repeated the observation, which I could conveniently do, the nest being in my garden, at various times from that hour till twelve, and always found some going and coming, even while a heavy rain was falling. Having, in the day-time, noticed some aphides upon a thistle, I examined it again in the night, at about eleven o'clock, and found my ants busy milking their cows, which did not, for the sake of repose, intermit their suction. At the same hour another night I observed the little negro ant, *formica fusca*, engaged in the same employment on an elder shrub.

Mr. Badham once observed a settlement of small black ants (*formica picea*) occupied in carrying supplies along the most frequented path of a garden. As, in looking out of a window at the proceedings of a mob, one cannot fail to notice any individuals who distinguish themselves, he had occasion, being favourably placed, to notice the proceedings of two ants in particular, charged, jointly, with a load too large for their strength. This industrious couple, in meeting others who (as is their well-known habit) would have been proud to join them, went out of their way to avoid receiving assistance, which, to all appearance, would have been very seasonable. Foolish ants! But they soon recovered their character for sagacity. Arrived near the entrance of their warehouse, they deposited the object which had cost so much labour, and went forward to reconnoitre the dimensions of the hole which was to receive it. After looking down for some time and seeing that it would do, they fetched the burden to the edge of the pit, went down, and dragged it after them. Sagacious ants! they must have agreed to assure themselves of the size in the first instance. One day, later in the same season, a body of the same ants was gathered together under a parsley plant four feet high, of which the slender stalk was heavily charged with seed: the seed was falling fast, and, as it fell, they rolled it off to a place of security with most obvious regularity, and every appearance of attention. But the operation was much more curious than it at first appeared; the seeds did not fall spontaneously, they were gathered by a party stationed on the branches of the plant, who stripped it as men gather apples. One ant was working away for nearly half a minute before his mandibles had succeeded in getting an individual seed sufficiently loosened to drop it to his colleagues below; at least twenty others were similarly occupied; and as the seeds fell, away they went. One seed, alone, in a particular instance, remaining attached to its stalk, the ant that took it off, as if perceiving that there was no more labour to transact on the spot, in place of throwing it down to his companions as before, kept possession of it, and made his way with it to the ground.

Crelian has related just such a story, in which grains of wheat are substituted for parsley seed. These grains were dropped by the gatherers above to the populace below. A friend, whose perfect accuracy may be relied on, gives his experience of the sagacity of ants in the following interesting recital:—In a villa near Geneva his bed-room was overrun with ants. After looking about to find from whence they came, he one day discovered that a rod of iron, which was in immediate communication with the garden under his window, was the means by which they gained access to his dormitory. From this, therefore, he repeatedly shook them for some days, killing a great many, until at last not one was any longer to be seen on the iron rod as heretofore: still they infested the premises. One night, happening to go to the balcony to look at the moon, which was at its full, and shining very brightly, he was struck by a sparkling appearance on the iron rod, and on examining it he found it covered by myriads of ants. Alarmed at the death of so many of their tribe, and warned by those who had escaped, they must, he thinks, have taken counsel together, and, knowing the hour at which he was not likely to molest them, have agreed to change their early habits, and burglariously to enter the premises after dark."

It is easy to collect from such facts, and they abound, that the same insect, which, in some instances, shows more than human intelligence, commits, just as often, the most remarkable errors. Ants, on reaching the bank of a river, in place of having the sense to stop, and, at least, take counsel together, and enquire for the bridge, will rush madly on, and are instantly carried down by the stream.

In examining an insect net, after it has swept the grass for capture, any one may observe that the ant, who, on the showing of his historian, Huber, is, next to man, the most intelligent of creatures, seems least disposed to improve the opportunity to escape from his reticulated prison. The bee bounces off resentfully. The grasshopper springs in a bound of unusual vigour; every other insect makes the best use of its legs and wings to be off, but the sagacious ant lingers behind. A strong blade of grass, the leg of a beetle, anything worthless that he can possibly lay hold of, is sufficient to detain him; yet he blockades his door every night at curfew, and, at cock-crowing, removes the wooden bars, except on rainy days, when the doors of all ant hills very properly remain sealed. On one occasion I could not help contrasting the industry, skill, and memory, as it would, of course, be called, of one individual of the formica family, with the preposterous proceedings of some of his friends. A wise and laborious ant was toiling up the bark of a chestnut tree, and pulling after him an entire snail-shell, the size of a hazel nut. He halted occasionally, as well he might, but he never lost hold of the shell, though the mere weight of it, one should have thought, would have pulled his mandibles out of joint. In a few minutes he had raised it upwards of three feet, and all was going on prosperously, when it so chanced that three or four idlers of the ant kind, and presently as many more, met him on his way. One labourer had almost done his work; his hind legs were already within the hole into which it was his plain purpose to introduce the shell, when the new comers proceeded to do just the reverse. They got upon the shell, they entered it, they persisted in sticking to it, and then the shell swerved to one side or the other, according to the disposal of his friends within, who had not even the sense to trim the boat; still, by great exertion, he held fast, and might, perhaps, have accomplished his task, when two more strangers thought proper to contribute to the weight, and brought on the catastrophe. The weary but persevering insect was obliged to 'let go,' and the shell, freighted with 'three insides,' and half-a-dozen 'outs,' fell to the ground. They left the conveyance in apparent alarm, and scampered off in all directions, while he remained for some time fixed to the spot of his discomfiture. The shell being subsequently examined, was found exactly to fit the hole in the direction in which the ant was dragging it, and in no other. Here we have one wise ant, but nearly half-a-dozen idiots; nor is it the only instance in which the conduct of this insect has appeared in one relation sagacious, and in another defective in common sense. I lately noticed the carcase of a large dead bee, moving, as it were, by some unseen mechanism below. On a nearer examination, I found the bee to be supported on the shoulders of half-a-score of the smallest ants, *(formica flava)*, who were dragging it along like a huge unlaunched ship, at the rate of three feet per minute. So intent were the ants on their work, that they were not to be seduced from it by the allurements of moist sugar, and other dainties, sprinkled over their path. Nothing could exceed the skill with which they over-came every obstacle that presented itself. They would sometimes straighten the joint of one of the bee's legs, or raise the margin of his wing, or even turn him completely over. After working in this way for half a day, they brought him to the door of their house, which was in the wall of ours, where, the entrance not being big enough to admit him, I left them late in the evening, fixing him up in a corner for future operations. The following morning I found him lying dismembered, apart from the ant-hill. Now, if these ants had reflected, would they not have pulled him to pieces where they first found him, and so have saved themselves much unnecessary trouble?

On the other hand, those ants on which Bonaparte amused himself with experiments, at St. Helena, though they stormed his sugar-basin when defended by a fosse of water, controlled their instinct, and desisted when it was surrounded with vinegar.

It is well known that ants are very intrusive and rapacious insects, and are particularly eager for sweets of all sorts; they are, therefore, usually found in the same places where bees seek their honey; indeed they even visit the bee-hive themselves, and, not satisfied with the honey alone, they sometimes even attack the young bees. On this account it is always a good thing to keep ants from bees. Particular care must be taken that they do not make their nest in the woodwork of the hives, as, in that case, nothing remains but transferring the bees to another. Mr. Stern bought a bee-hive, from which, for two years, he never could get a box of honey, although all his other hives produced honey in both years. The bees worked very diligently in it, but, as soon as they had sealed up their honey as far as the third box, they were at a stand.

As often as Mr. Stern came to this bee-house he killed, in this hive particularly, in the third box, many ants of the larger sort, yet not nearly so large as they are found in woods. The species was not mentioned. They were seen running out and in at the small openings in the worm-eaten box, and when the holes were stopped up with grafting wax, or wood, the ants still appeared. Nothing remained but to cut out the worm-eaten third box, which had been so often visited by ants, and it then appeared that all the four sides were covered with innumerable passages, in which were thousands of ants and larvæ, which had, for so long a time, devoured what the bees had brought home. This rather singular instance shows what attention ought to be paid to prevent ants from settling in the hives.

It has been also observed by M. P. Huber, that ants have their maladies. One of these is a kind of vertigo—the individuals attacked by it lose their power of guiding themselves in a straight line; they can walk only by turning round in a circle of small diameter, and always in the same direction; one, however, a worker, he observed, had the power of walking, from time to time, in a straight line; when placed upon its head, it continued its gyrations.

You will, I think, be pleased to hear that these laborious little creatures find, like other good workmen, that they who work in earnest can also enjoy a holiday, and that, in the intervals of their busy industry, ants amuse themselves with something apparently analogous to our wrestling and racing matches. Bonnett says, he observed a small species of ants which employed themselves in carrying each other on their backs, the rider holding with his mandibles the neck of his bearer, and embracing it closely with his legs; the position which the renowned John Gilpin may have sometimes been disposed to assume in his famous race through Edmonton. But, though the very palpable mistakes, committed by Bonnett, respecting these very ants, may, perhaps, tend to invalidate his authority with respect to their riding, we have the undoubted testimony of both Gould and Huber for their wrestlings. "You may frequently," says Gould, "perceive one of these ants *(formica rufa)* run to and fro with a fellow-labourer in his forceps, of the same species and colony." Mr. Gould observed that, after being carried for some time, it was let go in a friendly manner, and received no personal injury. This amusement is often repeated, particularly among the hill ants, who are very fond of this sportive exercise.

It was amongst the same species that Huber observed similar proceedings, which he has described with his usual minuteness and accuracy. "I approached," he says, "to the formicary of wood ants, exposed to the sun, and sheltered from the north. The ants were heaped upon one another in great numbers, and appeared to enjoy the temperature on the surface of the nest. None of them were at work, and the immense multitude of insects presented the appearance of a liquid, in the state of ebullition, upon which the eye could scarcely be fixed without difficulty: but when I examined the conduct of each ant, I saw them approach one another, moving their antennæ with astonishing rapidity, while they patted, with a slight movement, the cheeks of the ants. After these preliminary gestures, which resembled caressing, they were observed to raise themselves upright, struggle together, seize each other by a mandible, foot, or antenna, and then immediately relax their hold to recommence the attack. They fastened upon each other's shoulders, overthrew each other, then raised themselves by turns, taking their revenge without producing any serious mischief. They did not spurt out their venom, as in their combats, nor retain their opponents with that obstinacy which we observe in their real quarrels. They presently abandoned those which they had first seized, and endeavoured to catch others. I have seen some who were so eager in these exercises, that they pursued several workers in succession, and struggled with them a few moments, the skirmish only terminating when the least animated, having overthrown his antagonist, succeeded in escaping and hiding in one of the galleries.

In one place, two ants appeared to be gambolling about a stalk of grass,—turning alternately to avoid or seize each other, which brought to my recollection the sport and pastime of young dogs when they rise on their hind legs, attempting to bite, overthrow and seize each other, without once closing their teeth. To witness these facts, it is necessary to approach the ant-hills with much caution, that the ants should have no idea of our presence; if they had, they would cease at the moment their gambols or their occupations, would put themselves in a posture of defence, curve up their tails, and ejaculate their venom.

A person on first entering a tropical forest, is astonished at the labours of the ants; well-beaten paths branch off in every direction, on which an army of never-failing foragers may be seen, some going forth, and others returning, burdened with pieces of green leaf, often larger than their own bodies. A dark-coloured species sometimes migrates in countless numbers. One day, at Bahia, Mr. Darwin's attention was drawn by observing many spiders, cockroaches, and other insects, and some lizards, rushing in the greatest agitation across a bare piece of ground. A little way behind, every stalk and leaf was blackened by a small ant. The swarm, having crossed the bare space, divided itself, and descended an old wall. By this means, many insects were fairly enclosed; and the efforts which the poor little creatures made to extricate themselves from such a death, were wonderful. When the ants came to the road, they changed their course, and in narrow files re-ascended the wall. Having placed a small stone, so as to intercept one of the lines, the whole body attacked it, and then immediately retired. Shortly afterwards, another body came to the charge, and again having failed to make any impression, this line of march was entirely given up. By going an inch round, the file might have avoided the stone; and this doubtless would have happened, if it had been originally there; but, having been attacked, the lion-hearted little warriors scorned the idea of yielding.

The following is an account of three different kinds of ants that were observed in New South Wales, by the gentlemen in the expedition under Captain Cook.

"Some are as green as a leaf, and live upon trees, where they build their nests of various sizes, between that of a man's head and his fist. These nests are of a very curious structure; they are formed by bending down several of the leaves, each of which is as broad as a man's hand, and glueing the points of them together, so as to form a purse. The viscous matter used for this purpose, is an animal juice which nature has enabled them to elaborate. Their method of first bending down the leaves we had no opportunity to observe; but we saw thousands *uniting all their strength* to hold them in this position, while other busy multitudes were employed within in applying this gluten that was to prevent their returning back.

To satisfy ourselves that the leaves were bent and held down by the effort of these diminutive artificers, we disturbed them in their work; and as soon as they were driven from their station, the leaves on which they were employed sprang up with a force much greater than we could have thought them able to conquer by any combination of their strength. But though we gratified our curiosity at their expense, the injury did not go unrevenged; for thousands immediately threw themselves upon us, and gave us intolerable pain with their stings; especially those which took possession of our necks and hair, from whence they were not easily driven. Their sting was scarcely less painful than that of a bee; but except it was repeated, the pain did not last more than a minute."

Another sort is quite black, and their operations and manners of life are not less extraordinary. Their habitations are the inside of the branches of a tree, which they contrive to excavate by working out the pith almost to the extremity of the slenderest twig: the tree at the same time flourishing as if it had no such inmates.

When we first found the tree, we gathered some of the branches, and were scarcely less astonished than we should have been to find that we had profaned a consecrated grove, where every tree upon being wounded gave signs of life: for we were instantly covered with legions of these animals, swarming from every broken bough, and inflicting their stings with incessant violence.

A third kind we found nestled in the root of a plant, which grows on the bark of trees in the manner of misletoe, and which they had perforated for that use. This root is commonly as big as a large turnip, and sometimes much bigger: when we cut it, we found it intersected by innumerable winding passages, all filled with these animals, by which, however, the vegetation of the plant did not appear to have suffered any injury. We never cut one of these roots that was not inhabited, though some were not bigger than a hazel nut. The animals themselves are very small, not more than half as big as the common red ant in England. They had stings, but scarcely force enough to make them felt; they had, however, a power of tormenting us in an equal, if not in a greater degree: for the moment we handled the root they swarmed from innumerable holes, and, running about those parts of the body that were uncovered, produced a titillation more intolerable than pain, except it is increased to great violence.

Bancroft tells us that ants in Guiana are very numerous, various, and troublesome. They form themselves into a kind of republic, governed by laws like those of Europe: but that provident industry with which the latter provide for their sustenance during winter, is unnecessary for the ants of Guiana, who consequently lead a life of more ease and luxury. The largest species of ants in this country are black, and about an inch in length. They build their nests very high and capacious; but in good weather, in the day time, they almost cover the trunks and branches of fruit trees, and their bite is extremely painful.

The flying ants of Guiana are in size almost equal to the former: the head is triangular, with two antennæ, or feelers. The body consists of two parts, connected by a small sting; from the forepart, or thorax, arise the legs, which are six in number, and each has three joints. Each ant has four thin transparent wings, of a reddish brown colour. Their habitations are subterraneous, like those of moles; but in the wet seasons, when the rains have penetrated far in the earth, they are forced to quit their cells, which are drowned in water, and escape by their wings. At these seasons, they are often seen in flocks, which obscure the air, and render it difficult to breathe where they come, which is always toward the houses, for shelter.

Wood-ants are a small insect about two lines in length, and of a whitish-brown colour, and a very destructive insect, eating holes in wood, destroying the posts of houses, devouring clothes, books, &c. They are eaten, with great avidity, by domestic fowls, birds, and lizards, though, when bruised, they afford a very strong, volatile, disagreeable smell. They form a kind of arched road, about half an inch wide, concave, and somewhat flattish: these are often built on the floors and ceilings of houses, extending many hundred feet in length, with a variety of serpentine windings. The convex walls of this extensive habitation are composed of a whitish brown incrustated substance, which is easily destroyed: within its cavity the ants live, in a regular, well-ordered society; and when any breach is made in this wall, every inhabitant joins in the common labour of repairing the breach, which is effected with surprising rapidity. As soon as one of these habitations is discovered, a hole is immediately made in its walls, and the cavity filled with arsenic, which destroys the ants, and thereby prevents the mischief which would otherwise ensue. In the woods, however, they frequently inhabit large round nests, divided into a variety of cells, by their incrustated shell-like partitions. These nests are many feet in circumference, and each contains millions of these insects. They are brought from the woods, and broken among the poultry, who devour the ants with great avidity.

Malonet states, that in the forests of Guiana he once saw ant-hills which, though his companion would not suffer him to approach nearer than forty paces, for fear of being devoured, seemed to him to be fifteen or twenty feet high, and thirty or forty in diameter at the base.

Kirby mentions a black ant of Ceylon, called by the natives Coddia, which bites desperately, as bad as if a man were burnt by fire: they are of a noble nature, and do not begin the attack unless disturbed.

One of the most dreadful punishments devised by the cruelty of man, is practised by the Cingalese, and some of our soldiers in former times were victims of their atrocity. When any of these were taken prisoners, they were stripped naked, smeared over with wild honey, and tied to a tree in the vicinity of ant-hills. Thus exposed, they were speedily covered by myriads of these insects, which in a few days consumed their flesh, and left nothing but bones to bleach in the sun.

It is of these that Captain Stedman says, "These insects are black and very diminutive; but live in such amazing multitudes together, that their hillocks have sometimes obstructed our passage by their size, over which if one chances to pass, the feet and legs are instantly covered with swarms of these creatures, which seize the skin with such violence in their pincers, that they will sooner suffer their head to be parted from their body, than let go their hold. This must be owing to some venomous fluid which they infuse, or which the wound imbibes from them. I can aver," he says, "that I have seen them make a whole company hop about, as if they had been scalded by boiling water."

"The velvet American ant," says Martyn, "is a very elegant insect, about the size of the hornet, the body being beautifully marked with black and crimson spots of a velvet gloss. The heart is extremely strong and hard, and will bear a considerable pressure without material injury. The sting of this species inflicts a wound which occasions extreme pain and inflammation."

The sandy banks of the inland rivers of Guiana are peopled with trees called *triplis americana*, or ant-tree of Guiana. The Arawak Indians call the tree *jacuna*—the Warrows *epomahari*, the literal translation being ant tree—the Carabis, *hapi*—the colonists, from its growth, "Long John." The trunk is slender, and grows up straight, and its erect branches form a pyramid. When the colours of the flowers change from green to white and vermilion, the tree presents a most elegant appearance. One unacquainted with the contrary would consider the tree covered with white blossoms tinged with red, among which the dark green leaves have only occasionally room to make themselves visible. The incautious botanist who, allured by the deceptive appearance, should approach the tree to pluck the blossoms, would bitterly rue his attempt. The trunk and branches are hollow like those of the trumpet tree (*cecropis*). These are inhabited by a light-brownish ant, about two to three-tenths of an inch long, which inflicts the most painful bites. They fall upon their prey with the greatest virulence, and insert their mandibles almost instantly, as soon as they come in contact with any soft substance, emitting a whitish fluid; their bite causes swelling and itching for several days. If they find themselves captured, they attack and kill one another like the scorpions.

Colonel St. Clair relates how, through a slight neglect of precaution, he was annoyed by these creatures. Having killed a large snake and hung it up from his window to dry and preserve, he did not observe that its tail touched the ground. About twelve o'clock he awoke from his sleep in tortures, and rubbing his hands over his body, found it covered with something rough, which caused the pain he was enduring. When the servant appeared with a light, he found his whole body covered with small red ants sticking to him like leeches, from his feet upward: and it took half an hour before he could entirely rid himself of these venomous and troublesome insects; but when he attempted to re-enter his room, what a sight was there! The whole floor and some parts of the walls of his apartment were a mass of red ants. Every thing eatable in the room, clothes, and property of every kind, were in their possession: kettles of water were boiled, all the servants in the barracks volunteering their assistance. Millions were soon put to death, and the remainder completely routed.

On examining how they had stormed the room, the skin of the rattlesnake was found covered with dense columns of these destructive insects marching upwards. It may be imagined the Colonel did not again retire to rest without letting this conductor drop to the earth. Next morning he found the canister which had contained tea and sugar completely emptied, although it had been drawn up to the roof of the room as a security against cock roaches. The next discovery was a very sad one—a little pet deer which the Colonel had purchased from a negro, who had taken it alive from the savannah, was extremely ill. The cause of its malady was ascertained, when, on placing it on its legs, it was observed that it could not let one foot touch the ground; and to the grief of its kind master, he found that the red ants had absolutely eaten a hole into the bone. The poor little animal pined all that day, and died in the evening. Colonel St. Clair says, he was also frequently visited by swarms of large black ants, which invariably destroyed every thing eatable that they met with.

It was probably of the same kind that Captain Boteler relates that, curiosity having induced him to examine a species of loxia, a bird common to most parts of Africa, he and his companions climbed one of the trees, and took two nests; but they did not escape with impunity, being severely stung by a large kind of red ant, which, in their ascent, they shook down in great numbers from the boughs above. These insects were of a slender form, and about one-third of an inch in length. Their nests consisted of five or six leaves drawn together at the points, and cemented by means of a glutinous matter, and a sort of web of the finest texture.

Pliny says, "In the temple of Hercules at Erythræ, there was to be seen horns of a certain Indian ant, which were there set up and fastened for a wonder to posteritie. In the country of the Northern Indians, named Dardæ, the ants do cast up gold above ground from out of the holes and mines within the earth; these are in colour like to cats, and as big as the mice of Egypt. This gold beforesaid, which they work up in the winter time, the Indians do steal from them in the extreme heat of summer, waiting their opportunitie when the pismires lie close within their caves under the ground, from the parching sun. Yet not without great danger, for if they happen to wind them, and catch their scent, out they go, and follow after them in great haste, and with such fury they flie upon them, that oftentimes they tear them in pieces; let them make way as fast as they can upon their most swift camels, yet they are not able to save them. So fleet of pace, so fierce of courage are they, to recover gold that they love so well."

Mr. Hughes describes six kinds of ants in his Natural History of Barbadoes.

The wood ants, which are, he says, the most pernicious of all others, being so very destructive to timber of most sorts, that, if not prevented, they will in a few years' time destroy the whole roof of a house, especially if it be soft timber. They likewise bore holes through whole bales of linen, as well as woollen cloths. They are very expeditious in building their nests, which are long hollow tubes, the outside being an incrustation of a gritty clayey matter.

The great-headed ant, so called from its head (which is joined to the body by a small ligature) being so very large in proportion to the bulk of its body. It no way differs in other respects from the last described.

The small red ant is a minute insect, whose bite continues painful for nearly four hours. If these are killed on the skin, they will raise a blister. Their bodies are covered with sharp fine-pointed bristles, imperceptible to the naked eye. The stinging ant appears to be the same with what is to be seen in England in the summer season in most pasture lands.

The *formicina rufa*, or horse ant, forms those large nests of dry leaves and sticks we so frequently observe in the woods in our own country. Within these nests two genera of staphylini appear to be parasitical, *lomechusa* and *pella*; and in their deepest recesses, innumerable wood lice, *onisci*, are constantly found. The nature of the connection of these insects has not yet been ascertained, but perhaps it may be analogous to what has been observed between other species and the aphides. Another singular *staphylinus*, the minute *claviger*, which is totally blind, and otherwise remarkable in structure, inhabits the nests of the *formicina flava*, where it has once been discovered in our own country.

Rio Grande is infested with the black ants, and it is difficult to stop the progress of these formidable insects. If a brook be in their way, they will go under it; if a wall or a house, they will either go under or over it. It is said that they will kill an elephant; I have no doubt of their eating it, if it were killed. They generally march in countless millions; and I have frequently seen them, like a stream of black ink, about two inches broad, and many hundred yards in length. At certain intervals, about four or five inches on either side of their line, there were always large ants stationary, with their heads towards the line of march, and their forceps wide open. These officers seemed to be stationed to enforce the preservation of the exact line, which was as perfect as a riband. These ants quit the habitations of men, otherwise men must quit them, for the torment of such inmates could not be endured; but in a place where settlers had just arrived, I have known them to destroy, in one night, a whole litter of pigs, and more than a dozen fowls.

Ants on the Gold Coast will attack a living sheep in the night, and leave it a clean and perfect skeleton before morning. As soon as one of them assaults a rat, he is inevitably gone; for in attempting to escape he is attacked by another, and another, on his way, till he is overpowered, and conveyed by numbers to a place where they can devour him in safety.

If these insects have not a language, they have, at least, a method of communicating intelligence to each other. I have seen one or two, which, having discovered a worm or beetle, have immediately departed, and returned in a minute, bringing with them a hundred of their fellows. If these were not sufficient, more were called, and when they had secured their prey, they marched off with it in good order, assisting each other in the removal of the burthen.

Ants abound in Antigua, and infest every corner and cupboard in your dwelling. They have been held up as patterns of industry, and surely they possess that virtue in an eminent degree; for in vain does the thrifty housewife use her best endeavours to secure the contents of her larder from their depredations. They never tire, but surmount every difficulty, and, like the Goths and Huns of old, pour their countless legions over the whole face of the country. You may, with the greatest caution, suspend your choicest preserves from the ceiling, thinking that a place of security, but in a short time it is sure to be discovered by some roving ant, who, without loss of time, communicates the results of his foraging to his neighbours. The whole tribe are soon in motion, the discoverer acts as pioneer, and with great judgment conducts them over every impediment along the ceiling, down the string, until at length they gain the sweetmeats, where, *sans cérémonie,* they luxuriate at will. At other times, in order to guard the delicacy from the attacks of the ants, the vessel which contains it is placed in water, and then all is deemed quite secure. But not so. The ants are indefatigable; for no sooner does their sense of smelling tell them some choice dainty is enclosed therein, than they form a kind of bridge across the water, by one ant embracing the other by his antennæ, and in this way they transport and enjoy the luxury at pleasure.

There are ants of various sizes and colours: the large black ant, the small black, the red ant, the wild ant, &c., but of all these varieties, the sugar ant (*formica saccharina,*) is the most disagreeable. It is supposed the sugar ant was first brought into the West Indies in a slaver, from the Coast of Guinea, and after destroying vegetation to a great extent in Dominica, found its way to Antigua, where it committed great havoc upon the sugar-canes. They are of small size, and of a light brown colour, tinged with black; and when crushed, emit a mucilaginous substance, of a fœtid smell.

The damage occasioned by the *formica saccharivora,* or sugar ants, in the sugar plantations of Grenada, about the year 1777, affords a memorable proof of the tremendous power which these apparently insignificant creatures possess to do mischief: it was so excessive, that it was deemed expedient to burn down the whole of the standing crops of canes, and turn up the earth throughout the plantations, in order to destroy those ants which had fixed their habitations in the canes, and at their roots. These were to be replaced by new crops; and if that remedy proved ineffectual, it was determined to abandon the culture of the canes altogether. After sustaining considerable loss, and having in vain endeavoured, by every means, to exterminate the legions of ants with which the country was infested, without resorting to this final remedy, the inhabitants were, however, at length very fortunately relieved by the setting in of very heavy rains, which checked the ants in their career of devastation, and destroyed immense numbers of them. The ants in those parts are always numerous; but on this occasion they appeared suddenly in such bodies, that nothing could resist them. The country, in many parts, was literally covered for the space of miles with them. They descended the hills in torrents: the plantations were every where filled with them, as well as every road and avenue leading to them. Numbers of the domesticated quadrupeds perished. Rats, mice, and reptiles of every kind, became an easy prey to them; and even the birds, which they attacked wherever they alighted, till they were so harassed, as to fall at last within their power. Streams of water retarded their progress only for a short time; the foremost columns, pushing boldly into the water to certain death, and there perishing, formed at length an embankment, which, dividing the waters, afforded means for the rest to pass over in security. Even fire itself, which will oftentimes deter the most ferocious beasts of prey in their attacks, was in vain employed on this occasion. Fires were lighted in the routes which, from their course along the hills, it was obvious they would pursue; nor did this divert their track; they precipitated themselves into the fires in such bodies as to extinguish them; and though many by this means perished, the rest were enabled to continue their march unhurt.

A reward of £20,000 was offered to any one who should discover an effectual mode of destroying them: but it pleased Divine Providence to sweep them away in the torrents of a terrible hurricane in 1780.

The genus *cryptocerus*, or spider ant, has hitherto been considered wholly American; but some have been seen from New Holland. Luad says that its habits and movements as much resemble those of a spider as does its form. It is comparatively solitary, although consisting of three individuals; and is usually found upon or beneath leaves, lurking, coiled up, ready to spring upon its unwary prey. It derives its name from the structure of the head, which has, on each side, a deep lateral channel; wherein, in repose, the antennæ are inserted and concealed.

In the coasts forming the republic of Central America, ants are in most parts exceedingly numerous; and the city of San Salvador appears as if it were built on a large ant nest: they swarm in all the houses, and every description of food, not carefully protected, is in a short time covered with them. A large description of brown ants (called *sonpopes*) are very numerous in the fields, and are exceedingly destructive to the cochineal plantations, and the young maize plant, as they come in swarms, and in a few days eat up all the young shoots.

Sloane relates, says Robertson, that the reason why the Spanish planters deserted New Seville, was not owing to wars with the natives, but to the visitation of innumerable ants, who had destroyed all their provision grounds.

The same historian tells us that in the year 1518, the island of Hispaniola was afflicted with a dreadful visitation of those destructive insects—the particulars of which Henera describes, and mentions a singular instance of the superstition of the Spanish planters. After trying various methods of exterminating the ants, they resolved to implore protection of the saints; but as the calamity was new, they were at a loss to find out the saint who could give them the most effectual aid. They cast lots in order to discover the patron whom they should invoke. The lots decided in favour of St. Schwinberg. They celebrated his festival with great solemnity, and immediately, adds the historian, the calamity began to abate.

TERMES.

A genus of the neuropterous order of insects. The majority of these animals are natives of tropical countries, though two species are indigenous to Europe, one of which, thought to have been imported, is come so near to us as Bordeaux. Its characters are, that it has six legs, formed for running; two eyes, setaceous antennæ, and a mouth with two jaws. According to Gmelin, the characters are, that the mouth has two horny jaws, with a horny quadrified lip; linear acute fringes, four equal filiform feelers, or palpi, antennæ (mostly) moniliform, and two eyes. Linnæus enumerates three, and Gmelin eight species.

Fatale. Above brown; thorax with three segments; wings pallid, and costa or rib testaceous. This is the distinction of Degeer, and *T. bellicosum* of Smeathman. It is found in the shady parts of the equinoctial regions of India and Africa.

Destructor. Above testaceous; head black; antennæ yellow. Found in the islands opposite to South America, Africa, and India.

Arda. Black; abdomen with segments white at the apex; legs pallid. Found in the equinoctial parts of Africa.

Caprusa. Yellow, with hyaline wings; brown at the margin. Found in India and Southern Africa.

Fatidicum. Abdomen ovate; mouth pallid; brown eyes; antennæ setaceous. Found in Europe, chiefly the southern part.

Pulsatorium. Abdomen oblong; mouth red; eyes yellow; antennæ setaceous. Found in Europe and America.

Divinatorium. Abdomen transversely fulcated; brown mouth, and black eyes. Chiefly found in books; very lively, irritable, and whitish.

It is observed that the European species of termes are very small, compared with those of the warmer regions of Africa and America: and instead of being gregarious, as in those climates, are usually found single. Of these, the most known is the *T. pulsatorius* of Linnæus, a small insect of a whitish colour, and distinguished by Denham and some other naturalists, by the appellation of "pediculus pulsatorius." During the months of summer, it is common in houses, particularly in decayed wainscots, and is remarkable for emitting a long continued sound, resembling the ticking of a watch: it is commonly met with in collections of dried plants, &c., to which it is very injurious. It cannot bear, on account of its tender frame, the slightest pressure, and it is very quick in its motion. When magnified, the head appears large, the eyes very conspicuous, of a beautiful golden colour, and divided into innumerable hexagonal convexities: the antennæ long and setaceous, the palpi two in number, the thorax rather narrow, and the abdomen obtusely oval; the thighs, or first joints of the legs, thick; the remaining ones slender, and the feet furnished with very small claws. The whole animal is beset with scattered hairs. This insect, according to the observations of Denham, when first hatched from the egg, is white, oval, and very small, exactly resembling a common mite; furnished with eight legs, and beset with long hairs. After a certain time, it casts its skin, and appears in the form already described. Degeer has found on each side of the thorax the appearances of rudiments of wings, resembling a pair of oblong scales; and Dr. Shaw affirms, from his own observation, that some individuals of this species become winged at their full growth; the wings, four in number, being very large, of a slightly indistinct appearance, and variegated with blackish and brown clouds or spots. In the beginning of July, this change takes place, and several insects may be seen with the wings half grown; in a few days they gain their full size. Dr. Denham is of opinion that the ticking sound of these animals is analogous to the call of birds to their mates during the breeding season; and this opinion is very probable. The sound, says Dr. Shaw, as well as that produced by the "ptrisas fatidicus," or death-watch, seems to prove, in a convincing manner, that insects possess the faculty of hearing, though this be denied by some naturalists.

Of the exotic termites the most remarkable is the *T. bellicosus.* The animals of this species have lately been minutely described by Mr. Smeathman, from whose account the following particulars are extracted. The termites which have been taken notice of by various travellers in different parts of the torrid zone, and called by the name of white ants, resemble the ants in their manner of living, which is in communities, forming extraordinary nests in the surface of the ground, and various subterraneous passages, and also in their *provident and diligent labour;* but in both respects much surpass them. The termites are represented by Linnæus as the greatest calamity of both Indies, because of the havoc they make in all kinds of wooden buildings, utensils, and furniture, so that nothing but metal or stone can escape their destructive jaws, and this they do so vexatiously to mankind, that they destroy the interior, leaving the external form unchanged. They thus bore the balustrades of houses, excavate the planks of the floors, tables, chairs, and all kinds of household furniture, and they frequently leave so very slight a case remaining, that the whole falls to pieces upon the least touch.

Smeathman observes, that the insect, in its perfect state, has four wings without any sting; and should therefore be ranged under the *neuroptera*, and not under the *aptera* of the Linnæan system. The communities of termites consist of one male and one female, generally the parents of all the rest, and of three orders of insects, apparently of very different, though really of the same species.

Those of the first order are the working insects, or labourers; the second comprehends the fighting insects, or soldiers, which do no labour; and the third are the winged ones, or perfect insects, which are male and female, and capable of propagation, but neither labour nor fight; the kings and queens belong to this order, and within a few weeks after they are elected and elevated to this rank, they emigrate, and either establish new kingdoms, or perish within a day or two.

The largest species, called *termes bellicosus,* is the best known on the coast of Africa; it erects immense buildings of well-tempered earth or clay, which are constructed with signal ingenuity; it does infinite mischief in one respect, and in another it is peculiarly important and useful, by destroying those vegetable and animal substances which encumber the earth, and are noxious on account of their putridity. The buildings (usually termed hills,) which these insects erect, are, in their general form, like sugar loaves, and about ten or twelve feet high; and consist of an exterior part, which is large and strong, intended partly for defence, and partly for preserving a regular degree of warmth, in order to hatch the eggs and cherish the young; and an interior, which is the habitable part, divided into many apartments, for the residence of the king and queen, the nursing of their progeny, the accommodation of the soldiers and labourers, or magazines of provision. The royal chamber, in the interior of the building, or that occupied by the king and queen, is situated near the centre, and usually in the shape of a semi-oval within. In the infant state of the colony, it is not more than about an inch in length, but in time it is enlarged to six or eight inches in the clear, being in size adapted to that of the queen. It has doors or entrances, at pretty equal distances from each other, which entrances are of a size not to admit any animal larger than the soldiers and labourers, so that the king and queen, when once immured, can never go out. The royal chamber is surrounded by many others of different sizes, shapes, and dimensions; and they either open into each other, or communicate by passages suitably contrived. These apartments are connected with the magazines, formed altogether of clay, and nurseries. The provisions lodged in the former appear by the microscope to consist principally of gums, or inspissated juices of plants. The nurseries are composed entirely of wooden materials, joined together apparently with gums. These nurseries are occupied by the eggs and young insects, which appear at first in the shape of labourers, but white as snow. They are very compact, and divided into small chambers, not one of which is to be found of half-an-inch in width. They are placed round and near the royal apartments. As the queen enlarges, her chamber is also enlarged, and new apartments are fitted up for her attendants, and also new nurseries, at a remoter distance. "Thus," says Mr. Smeathman, "they continually enlarge their apartments, pull down, repair, and rebuild, according to their wants, with a degree of *sagacity*, *regularity*, and *foresight*, not even imitated by any other kind of animals or insects which he has ever heard of. These nurseries are always found slightly overgrown with, or plentifully sprinkled with small white globules, about the size of a small pin's head, first supposed to be the eggs, but found by the microscope to be small mushrooms. The royal chamber is situated at about a level with the surface of the ground, at an equal distance from all sides of the building, and in every direction surrounded by the apartments of labourers or soldiers, for the purpose of attendance. These apartments compose an intricate labyrinth, extending a foot or more in diameter, from the royal chamber, on every side. Here the nurseries and magazines of provisions commence, and being separated by small empty chambers or galleries, are continued on all sides to the outward shell, and reaching up within it two-thirds or three-fourths of its height. All these chambers, and passages leading to and from them, being arched, help to support one another, and the exterior building supports them on the outside.

Our limits will not allow our describing all the subterranean galleries or passages, and the manner in which they are artfully made to communicate with different parts of the building, and to suit the convenience of the labourers and soldiers, as thoroughfares for passing and repassing with their loads of materials and provisions.

There are other nests or habitations constructed by other species, which are in the form of turrets, or upright cylinders, and contain a number of cells. They are of two sizes, for the accommodation of a larger and smaller species; and again, another kind of nest, which is the habitation of a distinct species. This is generally spherical or oval, and built in trees.

Of the three orders above mentioned, the labourers, which are about one-fourth of an inch long, and twenty-five of them weigh about a grain, are the most numerous; e. g., in the *T. bellicosus*, there seem to be at least one hundred labourers to one of the fighting insects or soldiers. The soldiers are about half an inch long, and equal in bulk to fifteen of the labourers. The mouth of the latter is evidently calculated for gnawing and holding of bodies, whereas that of the former, or soldiers, has its jaw shaped like two sharp awls, a little jagged, and as hard as a crab's claws, so that they are incapable of anything but piercing or wounding. In insects of the third order, which have arrived at their perfect state, the head, thorax, and abdomen are wholly different from those of the ot orders, and they are furnished with four largish bro transparent wings. Their length is six or seven-tent of an inch; and each is equal in bulk to thirty labou ers. They have now two eyes which are visible, wherea if they had them before, they were not distinguishable The king and queen are lodged in apartments which are closed up, so that a passage remains merely for the ingress and egress of the labourers and soldiers; but by which (as we have already said) neither of the royal pair can come out; and in the business of propagation, the abdomen of the female extends to an enormous size, so that an old queen's will be fifteen hundred or two thousand times the bulk of the rest of her body, and twenty or thirty thousand times the bulk of a labourer; and by its peristaltic motion, are produced eggs to the amount of sixty in a minute, or eighty thousand and more in the space of twenty-four hours. The eggs are removed by the attendants into the nurseries, and, after they are hatched, *the young are provided with everything necessary* till they are able to shift for themselves.

It is remarkable, of all different species of termites, that the working and fighting insects never expose themselves to the open air, but either travel under ground, or within such trees or substances as they destroy, or through pipes made of the same materials as their nests. The termites, which build in trees, frequently construct their nests within the roofs and other parts of houses, to which they do considerable damage, unless soon extirpated; and the larger species enter under the foundations of houses, through the floors, or bore through the posts of buildings, making lateral perforations and cavities as they proceed. They are equally destructive when they get into a trunk containing clothes and other things, and into stores, &c.

Upon opening the hills in which the termites lodge, the behaviour of the soldiers excites admiration. When a breach is made, however forcibly it be done, a soldier will run out, and walk about the breach, as if to see whether the enemy is gone, or to examine what is the cause of the attack. He will sometimes return again, as if to give the alarm; but in a short interval he is followed by two or three others, running as fast as they can, and these are followed by a large body, others also succeeding these, as long as any one continues to batter their building. Nor is it easy to describe the rage and fury which they manifest on the occasion, biting everything in their way, and making a vibrating noise like the ticking of a watch, perceptible at the distance of three or four feet. If they get hold of any one who attacks their habitation, they will in an instant suck out blood enough to weigh against their whole body; and if they chance to wound the leg, the stain upon the stocking will be seen to extend an inch in width. They make their hooked jaws to meet at the first stroke, nor will they quit their hold, but suffer themselves to be pulled away leg by leg, and piece after piece, without the least attempt to escape. If, however, they are left to themselves undisturbed, they will in less than half an hour retire into the nest, as if they conceived their castle to be secure. Before they all get in, the labourers will be seen in motion, *hastening to bring materials for repairing* the breach. This they do without mutual obstruction, though their number be innumerable, and the work is soon finished. While the labourers are thus employed, the soldiers take no part with them. On a renewed attack, the labourers run with celerity into the numerous pipes and galleries with which the building is perforated; and the soldiers rush out as numerous and as vindictive as before. One circumstance more deserves to be mentioned, and that is, the loyalty and fidelity displayed by the labourers and soldiers in their attendance on the royal chamber. This chamber is a large nest, is capacious enough to hold many hundreds of the attendants, besides the royal pair, and it is always found full. These faithful subjects never abandon their charge in the last distress, but rather die in their defence than desert them. If in an attack upon the hill, you stop short of the royal chamber, and cut down about half of the building, and leave open some thousands of galleries and chambers, they will all be shut up with thin sheets of clay before next morning. If even the whole is pulled down, and the different buildings are thrown together in a heap of confused ruins, provided the king and queen are not destroyed or taken away, every interstice between the ruins, at which either cold or wet can possibly enter, will be so covered as to exclude both; and if the insects are left undisturbed, in about a year they will raise the building to nearly its pristine size and grandeur.

They appear, in discipline, to exceed all other insects. White ants are usually considered to be blind. Dr. König, who examined the *termes fatalis,* at Tranquebar, says they have only an obscure spot near the antennæ; and he could not perceive the gold-coloured point in the forehead described by Fabricius. They are impatient of light, and always, even in foraging, walk under cover.

Smeathman says, that the queen of these warrior white ants produces 31,536,000 eggs in one year.

Madlle. Merian says, that the species *cephalotes* is called by the Portuguese at Paramaribo, a Dutch colony in the province of Surinam, ants of visitation, as they appear only at certain seasons, or about once in two or three years. Its multitudes receive a cheerful welcome from the natives, who throw open the doors of their houses to admit them. The ants march in troops, enter, traverse every part of their dwellings, and, after destroying the rats, mice, scorpions, akerlaas, or cockroaches, and other vermin secreted therein, again take their departure. If any one chance to molest them, they fall upon him, and tear in pieces his stockings and shoes. They are much larger in size than the warrior termites, and seem to be less frequent than the other kind.

The following is from the pen of a friend of the compiler's :—

"A beautiful illustration I am able to afford of the way in which Divine guidance to the meanest of his creatures, causes good to be brought out of evil, and order out of worst confusion; making man's indolence to praise Him, exhibiting what Milton calls 'the irresistible weight of weakness.'

"I was walking one morning early in my garden, in Rio de Janeiro, four miles from the city, when my servants came running in alarm, shouting, 'The ants are come!' Utterly ignorant what they could mean, I hurried to the house, and found a column of ants about ten inches in width, pouring into a crevice near the foundation of the house. So far as the eye could reach along the lane did the phalanx appear unbroken. In vain were brooms applied, sweeping myriads away; in vain were sugar and flour strewed in their path to allure them; in vain was kettle after kettle of scalding water thrown over them, with a view of driving back the intrepid little host; the instant the rank was broken, the advancing column dispersed themselves in all directions, in quest of those who had advanced forward, and as if by the action of some electric power, quick as thought was the intelligence conveyed to the train behind, that reunited with precision more wondrous than the evolutions of Napoleon's legions, and on, on they go to the devoted dwelling, as if impelled by some mysterious destiny. What was to be done?

"At length an old man, a neighbour, appeared, who told my friend that this visitation is what the Portuguese call a "Bençad" (blessing); that when a l was not kept properly swept and washed, vermin kinds accumulated, the eggs of which are the fav food of ants, to which they are attracted at s times; they unite and advance to their work of clea and devastation. Pointing to a mountain some from their present scene of action, the old man 'Yon stream of insects has its recruits as far as that.' I was obliged to go to the city, le my faith in this uncouth 'blessing,' I must co somewhat wavering. Previous to my return ho the evening, I found that the train of these creatures had entirely disappeared, leaving no tra their visit except the hard shells of beetles and roaches, wings and legs, husks of their eggs, &c. No else had they molested, and where were they go dispersed each to his own tribe, like Tartar bursting on some wicked cities when their cup was full; like the Chaldean scourge in the da Jerusalem's doom."

Steadman says of these, in his travels in Sur "In their march, the troops passed some ant hi that were upwards of six feet in height, and, wi exaggeration, more than a hundred feet in ci ference."

Mr. Cope gives the following interesting account of these termites, or duck ants, in Jamaica.

In going only a few rods into the woods, a stranger cannot help observing many of the trees encompassed with large black round masses, often as big as a hogshead, adhering to the trunks or the branches. Curious to know the nature of so singular an appendage, he is told that these protuberant masses are the nests of duck ants, or termites; and, on examination, he finds that they are composed apparently of an earthy substance, comminuted very fine, and made into a sort of paste with animal gluten. The outside is friable, and much resembles, except in colour, that description of pastry technically called "short," as does the whole of that portion which is newly constructed; but the interior has a hardness and firmness superior to that of wood. The whole mass is composed of numberless passages of the diameter of a man's little finger, separated by walls about one-tenth of an inch thick, and running without any obvious regularity or design. On the surface walls being broken in, out swarm hundreds of the inhabitants, most of them active little fellows, with black heads; but many, rather larger and plumper, with *yellow* heads, are scattered among the crowd. I presume the former to be the labourers, and the latter the soldiers. A single covered gallery is invariably found to extend from the edifice, along the trunk of the tree, to the earth. Frequently, I have observed in the morning a similar covered gallery, as thick as one's thumb, extending all across the high road daily travelled by vehicles of various kinds; whence I conclude that the construction of such a passage was the work of the preceding night.

After a time, from some cause or other, the great nests are deserted; but continue to maintain their integrity for an indefinite period. In this state, the yellow-bellied parroquet (*Conurus flaviventus*) chooses to build her nest in them, excavating a chamber with her powerful beak. Snakes and their eggs are often found in them, and the eggs of lizards also. I once found in one several eggs of the small *palette-tip gecko*. It is now an excellent fuel, burning readily, with a flame and a glowing brightness, little inferior to coal. As no ammoniacal smell proceeds from it, and as it consumes into a clear white ash, I conjecture that the substance is of vegetable origin. It is sought after, in those districts and seasons in which the musquitoes make a more than endurable pest, in order to be burned in a chafing dish; as it gives out a good deal of smoke, which is the only weapon that those formidable though minute warriors fear. The smoke clears the house of the insect hosts in a few seconds, and is much preferable to that of wood, because far less painful to the eyes.

The termites do not often enter dwelling houses; but sometimes they do penetrate the floors, and devour whatever lies in their way, encrusting the residue with their galleries, which they invariably make as they go along. Some spare bedding that had lain in one corner of my bed-room for some weeks, tied up in a blanket, I found, on removing it, much injured in this way; the blanket being devoured in long meandering lines, and so defiled with the crustaceous deposit, as to be irreparably spoiled.

In the spring, a swarm of the winged males and females often enters the house, to the great annoyance of the inmates. The insects flock to the candle-shades, and spread themselves over the table, and especially crowd upon books, papers, or any other white materials. Their four wings, which are ample, are of a dull brown colour, possessing little transparency. Presently we are surprised to see several dismembered wings lying about; and, looking at the insects more carefully, we perceive, that they are, like the ants of more northern regions, casting these organs voluntarily, which seem to be annoying encumbrances, rather than serviceable parts of their bodies. They are seen to throw the wings very far forwards towards the head, and then suddenly jerk them back; these motions soon dissever their connexion with the thorax, which appears to be very slight.

It would appear that the ants of tropical regions also keep their milk cows, as their more northern friends do, for Mr. Grilding says:—

"Some sugar-canes, which were growing in a garden at Kingston, Jamaica, were observed, early in November, 1844, to be infested with *aphides*. They made their appearance in considerable swarms, and at once invaded both the leaves of the cane, and those of the plantain (musa). Beyond encumbering the foliage with substances that more or less obstructed their healthy growth, they did not seem to do any injury by lacerating the leaf, nor did they appear to waste the plant by diminishing its absorbent and excretory powers in any perceptible degree; they, however, continued increasing and multiplying . . . . . . and were to be observed ceaselessly visited by the common small ants, which played around them, and touched them caressingly. These provident creatures were taking honey-dew from the abdominal ducts, those remarkable distinguishing appendages of *aphides*."

Latreille says that the termites are furnished with an acid for softening the wood, the odour of which is exceedingly pungent; and that they moisten their galleries with a gelatinous substance similar to glue. Whatever may be the substance they use, it is certain that whenever they attack the sugar plantations, the sugar disappears from the cane, and a powerful acidulated liquor only remains. The canes become as red as Braziletto wood. As these insects are utterly incapable of subsisting exposed to light, the best remedy against being overrun by their colonies, is the effective action of the plough. Tillage, by horse or cattle implements, by which the soil is frequently disturbed or broken up, seems the only cure commensurate with the magnitude of the evil.

The Jesuit, Dobrizhoffer, in his History of the Abipones, gives the following very singular account of the ravages of ants in Paraguay. He does not name the species; but it is probable they were the termites. "The largest ants," says he, "which I had an opportunity of seeing, are formidable on account of their undermining buildings. They make burrows, with infinite labour, under churches and houses, digging deep, sinuous meanders in the earth, and exerting their utmost strength to throw out the loosened sods. Having got wings, they fly off in all directions on the approach of heavy showers, with the same ill fortune as Icarus, but with this difference, that he perished in the sea, they on the ground, to which they fall when their wings are wetted by the rain. Moreover, those holes in the earth, by which the ants had first to pass, admit the rain water, which inundates the caves of the ants, and undermines the building, causing the wooden beams that uphold the wall and roof first to give way; and, unless immediately supported, to fall along with the house. This is a common spectacle in Paraguay. The whole district on which St. Joachim is built, was covered with ant-hills, and full of subterranean cavities. Our house, and the one adjoining, suffered much from these insects. The chief altar was rendered useless for many days; for, it being rainy weather, the lurking ants flew in swarms from their caves, and not being able to support a long flight, fell upon the priest, the altar, and sacred utensils, defiling every thing. Ten outlets, by which they broke from their caves, being closed up, next day they opened twenty more. One evening there arose a violent storm, with horrible thunder and lightning: a heavy shower seemed to have converted our court-yard into a sloping lake, the wall itself withstanding the course of the waters. My companion betook himself to my apartment. Meantime, an Indian, the churchwarden, arrived, announcing that the floor of the church was beginning to gape, and the wall to open and be inclined. I snatched up a lamp, and ran to the place, but had hardly quitted the threshold of my door, when I perceived a gap in the earth; and before I was aware of any danger, sunk up to the shoulders in a pit, in the very place of the chief altar, but scrambled out of it, by the help of the churchwarden, as quickly as I had got in; for under that altar the ants seemed to have made their metropolis: the cavern was many feet long and wide, so that it had the appearance of a wine-cellar. As often as earth was thrown in by the Indians to fill it, so often was it dug out by the ants. In this universal trepidation, all the Indians were called to prop the gaping walls of the church with rafters and planks. The greatness of the danger rendered it impossible to remain quiet, whatever acts were adopted. That same night I removed from my apartment, which was joined to the church with the same beams and rafters, in such a manner, that if one fell, the other could not avoid being involved in the ruin. I have read that in Guayana, rocks and mountains have been undermined, walls thrown down, and people turned out of their habitations by ants, which I can easily believe, having myself witnessed similar, or even more incredible events. In Paraguay I was made thoroughly acquainted with the power of ants. *They are weak, and, compared with many other insects, diminutive*; but *numbers labouring*, and *unanimity*, render them formidable, and endow them with strength superior to their size. In the plains, especially those near the Paraguay, I have seen ant-hills, like stone pyramids, three or more ells high, with a broad base, and composed of a solid material as hard as stone: these are the store-houses and castles of the ants, from the summits of which they discern sudden inundations, and safely behold the floating carcases of less industrious animals. Elsewhere I have seen an immense plain, so covered with low ant-hills, that the horse could not move a step without stumbling. In the plains, you may often observe a broad path, through which you might suppose the legions of Xerxes might have passed. The Spaniards hollow out these pyramidal heaps, and use them for ovens, or reduce them to a powder, which, mixed with water, serves admirably to floor houses. Pavements of this kind resemble stone in appearance and hardness, and are said to prevent the breeding of flies and other insects. But hear what mischief ants commit within doors. They flock in a long and almost endless company to the sacks of wheat, and in a journey uninterrupted by day or night (if there be a moon), carry off, by degrees, some bushels. They will entirely strip fruit-trees of their leaves, unless you twist a cow's tail round the trunk to hinder their ascent, and cut away the crops so completely, that you would think they had been cut with a sickle. However, ants of various kinds are extremely destructive both to vineyards and gardens, devouring vegetables and pulse to the very root. Set a young plant to the ground, and the next day you will seek it in vain. They refrain from pepper on account of its pungency. If you leave meat, either dressed or raw, in your apartment, you will soon find it blackened with swarms of ants; they devour all sorts of trash, the very carcases of beetles, toads, and snakes. On returning to my apartment, I found a little bird which I kept in a cage devoured by ants. Nor do they abstain from the bodies of sleeping persons. In the dead of the night an army of ants will issue from the wall or pavement, get upon the bed, and, unless you instantly make your escape, sting you all over. This happened so frequently in the Guaranay colonies, that we were obliged to burn a candle at night; for lighted sheets of paper thrown upon the swarm are the only means of driving them away. The

Portuguese have an old saying, that the ants are queens of Brazil. Certainly we have found them the sovereigns of Paraguay. There may be said to be more trouble in conquering these insects, than all the savages put together; for every contrivance hitherto devised serves only to put them to flight, not banish them effectually.

In the neighbourhood of Valencia in South America, the white ants are found in such immense numbers, that it is scarcely possible to form an idea of the havoc they commit, and of the sinking of the ground that is occasioned by them. Their excavations are said to resemble subterraneous canals; these are filled with water, in the time of the rains, and become dangerous to the buildings of the town. In one part of the mountains, Baron de Humboldt found a small chapel, destined, according to its inscription, for prayers to be addressed to Heaven for the destruction of the termites.

A traveller writing from Belasore, Orissa, says, "I have not been up the hills to-day, because some of the party were frightened at the number of bears and tigers which are said to be there; but I am in hopes we shall go in a few days. I have been looking about me a good deal lately, and have noticed one very curious thing. The ground for five or six miles from our house, in one direction, seems to be covered with mounds of earth and small bushes; on examining these closely, however, I find they are all the nests of white ants. The green ones are those that are deserted, and over which the grass has grown—the others are still inhabited. In the plain visible from my window, there must be many hundreds of thousands of these hills, varying in height from three feet to ten or twelve, and many of them are six feet in diameter; and all of these are formed by little insects no larger than the common English ant. One part of their manner of building is most extraordinary: their nests are always completely covered in, so that without kicking them you cannot see a single ant inside; there are one or two doors in different parts of the building, but they are seldom used. Their mode of building is this—one day perhaps, you will perceive a single pinnacle of an ant's nest. You go and see it one day, and you feel it slightly raised, but curved, like a head stone. So it increases daily until it reaches the size I have described. It is like a man building a house,—as if he made a little closet with a roof on it, and then went inside and stayed there while the closet swelled and swelled until it became a perfect house. At the foot of these ant-hills are a number of large black ants on the watch f any straggling white ants, which they kill and ea These creatures abound in all our houses, and ru about the floors: they are about an inch in length, an bite, but do not sting.

Captain Adams, writing from Grewhe, the seaport o the kingdom of Dahomey, says, "The ants here ar extremely destructive insects, and from their size, number, and voracity, commit depredations that are scarcely to be credited. The bug-a-bug (the native name for the termes or white ants) is an insidious and destructive enemy: he is the pioneer ant, who works under a covered way, and often destroys chests, and their contents, before any mischief is apprehended. The larger ants have been known to strip bare to the bone the carcase of a cow in a single night. And Mr. Abson informed me, that he was once reduced to that state of debility by a severe attack of fever, as to be so wholly helpless, that the ants attacked him in the night, when lying in his bed; and that if, fortunately, one of his domestics had not awoke, they would have devoured him before morning, so incapable was he of calling for help or struggling with his assailants. At the time he related this anecdote to me, I was confined by indisposition in the very room where the circumstance occurred, and did not feel very comfortable at the prospect of being, perhaps, eaten alive.

The termite might be called the plague of Africa, if the destructive power that God has given it were not directed to a useful purpose. It never attacks green and healthful wood, but devours such as is in a state of decay; removing an immense load of putrid vegetable substances that are an obstacle to vegetation and the circulation of air. In a few weeks these insects will consume the bodies of large trees without leaving a particle behind.

When a large tree has fallen through age or violence, the termites enter at the side next the ground, and eat at their leisure all within the bark. Such trees have several times deceived me, when, in running, I have stepped two or three feet high, to tread on the upper part: I might as well have attempted to tread on a cloud.

The destructiveness of these insects is perhaps, however, one of the most efficient means of checking the pernicious luxuriance of vegetation within the tropics. No large animal could effect in months, what the white ant can execute in weeks. The largest trees which, falling, would rot, and render the air pestilential, are so thoroughly removed, that not a grain of their substance is to be recognised. Not only i air freed from this corrupting matter, but the p destroyed by the shade of these bulky giants o vegetable world, are thus permitted to shoot.

In those countries, the white ants answer ano purpose: they serve for food. In some parts of East Indies, the natives catch the winged insects j before the period of emigration in the followi manner. They make two holes, the one to the win ward, the other to the leeward; at the leeward ope ing, they place the mouth of a pot, the inside which has been previously rubbed with an aromati herb, called bergen; on the windward side, they mak a fire of ill-smelling materials, which not only drive these insects, but frequently the hooded snakes also, into the pots; on which account they are obliged to be cautious in removing them. By this method they catch great quantities, of which they make with flour a variety of pastry, which they can afford to sell very cheap, to the poorer ranks of the people. When thi food is used too abundantly, it produces cholera, which kills in two or three hours.

From the great resemblance of their manner to thos of ants, they have been called "white ants." But the true ants are their mortal enemies, and prey upon them with the greatest voracity, especially at the period of their swarming, at the commencement of the tropical rains—the only time when they voluntarily make their appearance abroad.

Although probably all termites are of tropical origin, a few species have located themselves in the south of Europe; but it is to be hoped that the temperature of our climate is too variable and cold to suit the constitution of these insects. Well may one be thankful to be free of such companions, when reading such accounts as the following. The Rev. C. Acland, writing from Midrapore, says, "The ants, of which there are three sorts, are a great nuisance. Every house swarms with them; and unless the legs of tables, drawers, &c., are constantly standing in jars of water, they attack the dinner-cloths, and, in fact, every thing they can reach. First, there is a small red ant, whose bite causes a very hard red swelling, which continues very painful for some days. Second, a great black ant, about the size of an English wasp, which bites, but does not sting. Third, the white ant, rather larger than the common English ant, which come in a swarm, and in one night will devour a table or a shelf-full of books. You may come down in the morning, and find your table and books apparently all right, but no sooner do you touch

them, than they all crumble away to powder. I w
the other day in want of a sheet of pith, on which
fasten some butterflies, and going into my dressin
room, where I knew I had left four pieces on a sh
only the day before, I found them apparently in g
condition; but on taking them up, discovered them
be only so much dust. I then examined the ot
things on the shelf, and found them to be in the sa
state. This was the work of the white ant, which
swarming about. On spreading turpentine on
shelves, it destroyed the ants. If let alone, they wo
in about two days have eaten the chest of drawers,
my clothes, and everything in the room."

Again, writing from Cuttack, "My wife and I w
sitting after tea, enjoying the cool breeze that c
through the open venetians, when suddenly it be
to rain. In an instant the room swarmed with ins
of all sorts. There was the beautiful large g
mantis; and as we were watching his almost hu
motions, a grasshopper and a large brown cricket
against my face; the flying ant, which emits a
nauseous effluvia," &c., &c. A long list of unplea
companions, over head and under foot, follows; en
to make us thankful to inhabit our temperate clin
and leave off grumbling at an occasional fog.

In the Rev. C. Acland's account of the manners and customs of India, he says, "The insects are a great nuisance here (Midrapore). If the candles were not protected by a glass shade, they would be instantly extinguished. Thousands of insects of all sizes swarm, jumping and flying about the lamps, of all colours, green, yellow, blue; and many of them sting, while others smell most abominably."

There is little to be said of insects in general in the northern regions. Cold is in general adverse to the production and increase of insect life, and even temperate climates are much less productive than tropical or equatorial regions. It is probable, however, that the distribution of many northern species is still unknown. It was formerly supposed that in Iceland there were none, and that even in Norway there were very few, and their absence from those countries was attributed to excess of cold. Honabon contradicted this opinion in regard to Iceland; and although Dr. Hooker, in his interesting "Recollections" of a tour in that island, states that he met with few, yet Olafsen and Povalsen, during their residence there, collected 200 different species in one small valley.

Otho Fabricius resided six years in Greenland, and collected only 63 species of the insect class, properly

so called. In the still higher latitude of Winte
bour, where Sir Edward Parry sojourned, o
species of insects were collected from the begin
the month of September till the August followi
Greenland, according to Mr. Kirby, every inse
two exceptions, orthoptera and hemiptera, has
presentative; but in Melville Island, besides th
ficiencies, neither coleopterous nor neuroptero
observed, and even the mosquito, that shrill ty
the Lapland plains, appears to have ceased fro
bling along those hyperborean shores. It mu
ever, be borne in mind, that insects can escape
tremes of cold, not only, as Mr. M'Leay obse
passing certain periods in the pupa or torpi
but also by being, while in that state, usuall
in the earth, where they are but slightly sensi
of the most extreme rigour of winter. Wh
chiefly require is the presence of heat durin
period of their existence, and the greater, wit
tain limits, is the heat, the more active will
vital principle. On the American continent
tremes of heat and cold in the course of the y
as is well known, incomparably greater than i
of the same latitude in Europe. We may, t
readily conceive how particular families of ins

inhabit a wider range of latitude in the former country than in the latter. We see also how insects may swarm in the very coldest climates, such as Lapland and Spitzbergen, where the short summer can boast of extraordinary rises in the thermometer, because the energy of the vital principle in such animals is, within certain limits, proportionate to the degree of warmth to which they may be subjected, and escapes in a manner the severe action of cold. It is on the above principles, also, that Mr. M'Leay accounts for what certainly at first seems an extraordinary circumstance in the geography of insects, namely, that their tropical structure extends much farther north in America than in Europe, that is, in a manner directly the reverse of that which has been noted by botanists to occur in the vegetable kingdom. When we examine insects from the neighbourhood of New York, and compare them with species of the same families from Brazil, we shall find their difference of structure infinitely less than that which would result from a comparison of the entomological productions of the environs of Madrid with those of the banks of the Congo. Mr. M'Leay admits, that although in his opinion the insect tribes suffer less in cold climates than plants, it does not therefore follow that the prevalence of cold has no effect in relation to the destruction or prevention of insect life. In truth, the diminution of the number of species becomes very conspicuous as we advance towards the poles; but this the learned author of the "Horæ Entomologicæ" supposes to be owing rather to the short continuance of the summer warmth, than to the lowness of the existing degree. In accordance with this view, we certainly find that many insects, such as gnats, mosquitos, &c., which pass their larva state in water, thus avoiding the extremest cold, and whose existence in the perfect state, being naturally ephemeral, must therefore, suffer little from the shortness of summer are nowhere more troublesome than among the moors and marshes of the north. On the other hand, the number of *coleopterous* species, which being naturally longer-lived, require a greater continuance of warmth, is sensibly diminished amid those dreary wastes. On the last day of Captain Parry's attempt to reach the North Pole over the ice, a species of *aphis* was found in latitude 82° 26′ 44″ about 100 miles from the nearest known land. This may be considered as the extreme northern boundary of insect life.

Speaking of those in Norway, Bremner says:—"Pleasant as it generally is to rest in such forests as those we were now traversing, there are some localities in them of which the inexperienced must especially beware. In journeying through them, ever since we came to Zollhätten, where they are especially abundant on the island in the middle of the cataract, we had, every now and then, seen piles of withered fir needles, small twigs, rotten bark, and light mould, rising round a large stem, or still more frequently on the root of a tree that has been cut down. Some of these hillocks are not larger than a mole-hill, others are full six or seven feet high: but even the largest appear at first mere heaps of dead matter. On approaching them, however, they will be found to be peopled by thousands on thousands of industrious ants, blacker, larger, and stronger, than ants even are with us. On gazing a little, it will be discovered that the marvellous instinct of these creatures has taught them to adopt all the order and economy of a well-governed state. There would appear to be lawgivers, magistrates, policemen: every member of the community is in his proper place, and not one is at rest. Such hurrying to and fro was never seen. One would say that there is some great political meeting about to be held in the Spafields of this populous capital; that the houses of parliament are on fire, or that the Queen is going to be crowned. A little patience, however, will show that nothing but order reigns where we at first thought all was rude confusion; in fact, such a scene of nicely-regulated industry has never been witnessed. The streets, and their tributary lanes—for there are streets and lanes, both numerous and regular—are indeed full to overflowing: but look more narrowly, and you will discover that of all the throng, there is not one sauntering for mere amusement. Some are carrying, some are pushing, some are trying to lay hold of their load, which is often seemingly of a size quite beyond their tiny powers to manage. Such enemies are they to indolence, that if the stranger—and there lies the peril we spoke of—inadvertently sits down too near them, to muse in idleness on some foolish fancy, these indignant reprovers instantly visit him in flocks, and give him, not a gentle hint to be jogging on, but many a good hard bite, by way of telling him that this is not a world in which we can play the sluggard with impunity. Apart from such bites—and he soon learns to avoid them—there is nothing but pleasure and instruction in viewing these ant-hills, which really constitute one of the most delightful, as they are certainly among the most remarkable, sights of the northern forests. In some parts of Norway, the people make vinegar from the unhappy carcases of their exemplary friends. Formic acid, obtained from ants, was formerly employed as a volatile stimulant.

Mr. Rae Wilson observes that "it is almost impossible to pass through any wood in Sweden, without perceiving the labours of the ant, that emblem of industry. The height and diameter of their nests, or mounds of earth, almost exceed credibility. These exhibit prodigious monuments of their industry and perseverance. Over the innumerable woods in this country, the number of their hillocks is truly extraordinary, as well as their height.

These industrious little creatures have many potent enemies. In our own country, and other temperate climates, these are chiefly birds and lizards. In the tropics, as there insects would become destructive, from their numbers and habits, Divine Providence has appointed them as food to animals, who consume thousands of them in a moment. Of these, the most formidable are, the myrmicophaga, or ant-bear, and the myrmelion, or ant-lion. We will first consider the ant-bear.

It has been remarked, when speaking of the ant-bear, "if we carefully survey the various parts of the earth, we shall find that the most active, and most sprightly, as well as the most beneficial quadrupeds, have been placed contiguous to man, and have been made either subservient to his pleasure, or have maintained their independence by their vigilance, their cunning, or their strength; and it is only in the remotest solitudes that we are to look for the helpless, the depressed, and the monstrous births of nature. In whatever country the ant-bear is met with, it always chooses the woods for its retreat, and conceals itself under the withered leaves. From this asylum it seldom ventures, as the industry of an hour supplies it with food to support existence for several days."

Martyn divides them into the great ant-eater, inhabiting Brazil and Guiana. Even the American panther is often unequal to overcome this animal; for should the great ant-eater find an opportunity of embracing it, she fixes her talons so deeply in its sides, that she seldom quits her hold till after the death of her adversary.

The middle-sized ant-eater, who inhabits Brazil and Guiana, in its manners and instinct exactly corresponds with the great ant-eater.

The striped ant-eater is a native of Guiana. Its flesh is there esteemed as delicious food.

The lesser ant-eater also inhabits Guiana. Another species of it has been discovered at the Cape of Good

Hope, and in the Island of Ceylon. Mr. Strachan, in his account of Ceylon, describes an animal to which the natives give the name of *talgos*, or ant-bear. It is therefore an unquestionable fact, that these animals exist in the old world as well as in the new.

Myrmicophaga, ant-eater, in zoology, a genus of quadrupeds of the order *brute.* The generic character is—teeth none; tongue cylindric, extensile; mouth lengthened into a somewhat tubular form; body covered with hair. The animals of this genus live entirely on insects, more particularly on the various kinds of ants; in order to obtain which, they extend their tongue, which is of a very great length, and of a roundish or worm-like form, into the nests of these insects; and when, by means of the viscid moisture with which it is covered, a sufficient number is secured, they retract it suddenly into the mouth, and swallow them. A part of the generic character of the *myrmicophaga* is the total want of teeth, in which particularity it resembles no other animals, except those of the genus *manis*, in which the same circumstance takes place. There are, however, in the ant-eaters, according to the observation of Broussonet, certain bones or processes, not unlike teeth, situated deep at the entrance of the gullet, or œsophagus; or rather, according to Camper, at the lower end of the jaws. The species of ant-eaters are seven in number.

Species.—*Didactyla:* little two-toed ant-eater. Two toes on the fore-feet, four on the hind; and a bushy tail. This is an animal of great elegance. It is not superior in size to a squirrel; measuring little more than seven inches from the nose to the tail, which is longer than the body and head; the head is small; the snout sharpened and slightly bent downwards; the legs are short; the fore feet have only two claws on each, the exterior one much larger and stronger than the interior; on each of the hind feet are four claws of moderate size; the ears are small, and hidden in the fur; the eyes are also small. The whole animal is covered with a beautiful, soft, and somewhat crisped or curled fur, of a pale yellow colour, or rather yellow-brown; the tail, which is very thick at the beginning or base, gradually tapers to the tip; and the lower surface, for about the space of four inches from the tip, is bare; the tail in this species being prehensile, and the animal commonly residing on trees, and preying on ants, by means of its long tongue, in the manner of other species. It is a native of Guiana and the Mosquito shores, walks slowly on its heels, feeds only in the night and emits no cry.

Tridactyla. Three toes on the fore-feet, and four on the hind; the tail is bushy. It is found in divers parts of India; climbs trees, and defends itself against the attacks of flies by its broad tail.

Mr. Schomburgk says: "It runs with a peculiar trot, and is not, as has been represented, slow in its movements and easily overtaken; for when chased, it will keep a horse in canter, and does not tire readily. White ants or termites constitute its chief food. The movements of the tongue, alternately protruded and retracted, are so rapid, that it is no longer surprising how so large an animal can satiate its appetite with such minute insects. With the termites, he swallows a considerable quantity of the material of which the ant's nest is constructed.

The ant-bear makes neither nest nor burrow, its ample tail securing it as sole protection against the inclemency of the weather.

A young one, estimated about four weeks old, was presented to Mr. Schomburgk by Don Pedro Ayres. While riding on horseback over the savannahs, he discovered the parent with the young, and immediately gave chase. After she had kept the horse in full canter for half-an-hour, she found herself so closely pressed that she put herself in defence: my friend was ready with the lasso, and having thrown it dexterously over her, she was secured. To the last moment the young one had clung to the mother. The young ant-bear was wild at first, and sought for some dark corner in the room in which it was confined, in order to hide itself. When we approached it, it put itself immediately in defence like the adult ones, and struck out with its right paw, uttering at the same time a growl like that of an incensed puppy. After a few days, however, it became accustomed to its situation, and an Indian woman took upon her to feed it with milk and cassada, and sometimes with white ants. It soon showed great attachment to her, and followed her like a dog. It appeared to be of a very cold nature; not only the extremities, but the whole body felt cold t the touch, although we kept it wrapped up in a blanke It preferred, however, to be nestled, and to be taken u and on putting it down, it uttered a whining but r an unpleasant sound. When it did not succeed attracting attention, and was not taken up again, whining sound was raised to a harsh and grating n Of the dimness of its sight we had various proofs hurt itself frequently against objects that stood in its way, not observing until it came in contact with them. Its power of smelling was exquisite, and it could discover its nurse, or any person to whom it had taken a liking, at a considerable distance. Upon these occasions it would immediately commence the whining sound so peculiar to this animal. It was an expert climber, showed its attachment by licking, and was very gentle, and even sportive: we had it for nearly two months, and as it began to feed itself, we had great hopes of rearing it; but we were unable to procure milk, and, whether in consequence of the change of food, or some other cause, it gradually declined. I found it sometimes as cold as ice, and stiff, and though I restored it repeatedly, it died one day during my absence. If the supposed fact, that the number of males among these animals is considerably smaller than that of the females could be substantiated, in that circumstance would rest an additional ground for supposing that the extinction of its species, like those of the *edentata* in general, is determined upon. The flesh of the ant-bear is eaten by many of the native tribes, and also by the negroes, who consider its skin a great delicacy.

Jubata: great ant-eater, about as big in the body as a butcher's dog; four toes on the fore-feet, and on the hind five; the tail is bushy. There is a variety with a shorter face and shorter legs. This, as its name imports, is by much the largest of the genus, being seven feet in length from the tip of the nose to the end of the tail; but if measured to the origin of the tail, it is no more than about five feet and a half. It is an animal of uncouth appearance; the head is small, the snout very long, the eyes small, the ears short and round, the shoulders thick and muscular, from whence the body tapers towards the tail; but the thighs are thick and stout. The colour of the animal is a deep grey, with a very broad band of black running from the neck downwards, on each side of the body, growing gradually narrower as it passes down. This black band is accompanied on the upper part by a streak of white; the fore-legs are of a lighter cast than the hinder, and have a patch or spot of black in front, not much above the foot; the tail is black, extremely long and bushy; the hair on the whole body, but especially on the tail, is very harsh and coarse; the two middle claws of the fore-feet are extremely large and strong, which renders this creature, though destitute of teeth, a very formidable adversary, since it has been known to destroy animals of much greater apparent strength than itself, fixing its claws upon them, and exerting such powerful strength as to kill them by continued laceration and pressure. It is a native of Brazil and Guiana. It is chiefly a nocturnal animal, and is said to sleep during the greatest part of the day in retired places, and its manners dull and heavy. It is said to swim with ease, at which time it flings its tail over its back. A living specimen was some years ago brought into Spain, and kept in the royal menagerie at Madrid. In this state of confinement it would readily eat raw meat, cut small, and was said to swallow four or five pounds in a day. Its length was six feet from the nose to the end of the tail, and its height was two feet.

Tetradactyla: four toes on the fore-feet, and on the hind-feet there are five. The tail is naked. It inhabits Formosa, and the neighbouring parts of Asia, and South America; wanders only in the night, sleeps by day; when angry it seizes a stick, and fights sitting on its hind legs. The tail of this animal is bald at the extremity, by which it is able to suspend itself from the branches of trees. It has a black stripe on the breast and side.

Orycteropus Capensis: Cape ant-eater. Four toes on the fore-feet; the snout is long; the ears are large and pendulous; the tail is shorter than the body, and tapering to the tip. It measures about three feet five inches from the snout to the origin of the tail. It is found at the Cape of Good Hope, is larger than the other species, being nearly the size of a hog, weighing about a hundred pounds. It burrows in the ground, making holes as large as those of a fox. These holes are dangerous to horseback travellers, being generally concealed among the grass, which is often most luxuriant around them. The facility with which he burrows is such, that it is quite impracticable to dig him out, as he can in a few minutes bury himself at a depth far beyond the reach of his pursuers; and his strength is so great, as to require the united efforts of two or three men to drag him from his hole. Like the *pangolins* in Asia, the *myrmicophaga* in America, and the *echidna* in New Holland, this animal feeds entirely upon ants. Wherever ant-hills abound, there may the *aard-vark*, or earth-pig, be found. The Korah Caffres call him *nuraga*, the Hottentots call him *goup*. On the approach of night he repairs to the nearest inhabited ant-hill, and scratches a hole in the side, just sufficient to admit his long snout; he then inserts his long slender tongue into the breach, and entraps the ants, which fly to defend their dwellings, when, mounting upon the tongue of the *aard-vark*, they get entangled in the glutinous saliva, and are swallowed by scores. On the slightest alarm he seeks security in his subterranean dwelling. This creature climbs much better than it walks. It has no tusks, and depends, therefore, entirely on this mode of concealing itself for its safety.

Colonel St. Clair, writing from Mibiri, near the Demerara River, gives the following account of one of these animals :—

"On approaching Mr. E.'s settlement, I observed two negroes returning from the forest, one of them having on his shoulders a large animal, apparently dead. I soon came up with them, and ascertained that it was an ant-bear, which they had just killed in the stump of an old tree. I had heard of this curious animal, but never yet had met with it; and, on examining it, I found it to be covered with very long shaggy black hair on the back and belly; its neck and sides were of a yellowish grey. The head was extremely long and slender, of a light bay colour; the eyes small, the ears short and round; the mouth without teeth, and only large enough to admit its tongue. The tail is of an enormous size; the animal when asleep covers itself with it, and at other times it trails along the ground. The hind-legs are shorter than the fore, and black, with five claws; those before of a dirty white, with four claws, the two middle ones being of enormous length. These are its only defence.

"This creature is chiefly found in low and swampy forests, where he goes up and down in search of ant's nests,—beware how you approach him, for his fore-legs have wonderful strength, and when he seizes an animal, he hugs it close to his body, and keeps it there until it dies through pressure.

"Without teeth, and without the power of burrowing for its safety, this extraordinary quadruped ranges through these forests in perfect security, not fearing the attack of the jaguar, or of the largest serpents. The Indians themselves have a dread of coming near him, after disabling him in the chase, until he is quite dead. It is, perhaps, on account of this caution, that naturalists have given so few correct drawings of him.

"He is a pacific animal, and never begins the attack; but when assaulted, he throws himself on his back, and in this attitude, laying hold of his enemy with his claws, which he now unfolds, the aggressor is sure to pay for his rashness with his life. The havoc which he makes in the ant-hills is astonishing, for in a short time he completely clears them of their inhabitants. Laying his tongue, which is nearly twenty inches in length, resembles a worm, and is covered with a slimy substance, upon the ant-hill, he waits till a number of the insects get upon, and stick to it; when, drawing it into his mouth, he destroys thousands, and renews the operation until not one is left. He then marches in search of another hillock, and entraps in the same manner the unwary inmates; but, in case of disappointment, he is furnished with the faculty of fasting without the smallest inconvenience. The flesh of this creature being good eating, it is sought after by the Indians, who generally shoot it with poisoned arrows; and its food being so different from that of other animals, it seldom comes into contact with them. This specimen measured six feet three inches from the end of the tail to the snout. A part of it was dressed for dinner, and we found it tender and good."

There are two species of wild hog in Southern Africa, *sus larvetus,* the *bosch vark,* bush pig, which is about two-and-a-half feet high, and five feet long, and has a tubercular excrescence covered with coarse hair on the face; and *phesochærus Africanus,* the *vleckte vark,* pig of the plains, which is somewhat larger than the former, and has a large head, a large fleshy protuberance behind each eye, and a warty excrescence on each side of the muzzle. Both are of a brown colour, but the latter, which is sometimes called the marked hog, is of a reddish tinge.

Aculcata. Aculcated, or porcupine ant-eater. Body covered with long, sharp spines; tail short. The aculcated ant-eater is one of those curious animals which have been lately discovered in New Holland, and is a striking instance of that beautiful gradation so frequently observed in the animal kingdom, by which creatures of one tribe or genus approach to those of a very different one. It forms a connecting link between the very distant Linnæan genera of *hystrix* (porcupine) and *myrmicophaga* (ant-eater); having the external coating and general appearance of the one, with the mouth and peculiar generic characters of the other. This animal, so far as may be judged from the specimens hitherto imported, is about a foot in length. In its mode of life it resembles the rest of the ant-eaters, being generally found in the midst of some large ant-hill. It burrows with great strength and celerity under ground, when disturbed; its feet and legs being strong and short, and wonderfully adapted to the purpose. It will even burrow under a pretty strong pavement, removing the stones with its claws; or under the bottom of a well. During these exertions, its body is strengthened or lengthened to an uncommon degree, and appears very different from the short or plump aspect which it bears in its undisturbed state.

The *Pentidactyla*, or striped ant-eater, is a native of the Mosquito shores. It is distinguished by having five toes on the fore-feet; the tail is long, flat, and entirely covered with hair. It is about thirteen inches long, and ten high.

We come now to consider the *myrmelion*, the next most formidable enemy of the poor ants. So early as the thirteenth century these curious creatures attracted the attention of Albertus Magnus, who gives a very correct account of the pitfalls of myrmelion. The following is from a naturalist of much later date.

Formica leo, the ant-lion, a native of Africa, is a remarkable species of insect, which is, in its perfect state, a winged creature, approaching to the nature of the *libellulæ,* or dragon-fly. When in its perfect state, it is indeed a most elegant insect; but in its prior condition of a creeping animal, it has a wonderful art and address in catching its prey. It is in this state that it is known by the name of *formica leo,* as it chiefly feeds upon ants.

The ant-lion will not take a dead insect, however recently killed. Reaumur tempted it with fine fat blue-bottle flies, but it would not touch them. Those insects whose instincts teach them to simulate death when danger is near, escape the fangs of the ant-lion. The antennæ of these insects are about the length of the thorax, and thickest at the tip. The mouth is armed with jaws, teeth, and six feelers. The wings are deflected; and the abdomen of the male terminates in a forceps composed of two straight filaments. The larvæ are hairy, with six feet, and strong, exserted toothed jaws. Reaumur says, they eat plums and other fruits, but they chiefly prey, with savage ferocity, on ants, and some of the other smaller insects; and, for the purpose of ensnaring the prey, form a kind of funnel or pit in light earth, at the bottom of which they lie buried. His long neck and flat head he uses as a spade; and the strength of these parts is so great, that he is able to throw off at once a considerable quantity of sand to even six inches distance. Here he lies, leaving only his horns visible, and patiently waits for his prey. When an ant, or any other small insect, happens to walk over the tops of the hollow, its steps force down some of the particles, which gives the ant-lion notice of its presence. He immediately throws up the sand which covers his head, to overwhelm the ant, and, with its returning force, brings it to the bottom this he continues to do till the insect is overcome, and falls between his horns. Every endeavour to escape, when once the incautious ant has stepped within the verge of the pit, is vain; for in all its attempts to climb the side, the deceptious sand slips from under its feet, and every struggle precipitates it still lower. When within reach, its enemy plunges the points of his jaws into its body, and, having sucked out all its juices, throws out the empty skin to some distance, *that the den may not become frightful to others*, by seeing their fellows' carcases strewed about. This done, the insect mounts the edges of his pit, and repairs whatever injury it may have sustained; and then, descending, again conceals himself at the bottom.

Is not this creature like the deceiver of souls?—that crooked serpent, who lies in wait to devour and to destroy? Yet, unlike one so eternally deceiving and deceived, the change in its body from its earthly den to the free bright air, produces an equal change in its character. And when it casts off the spoils and cumbersome weight of its first form, so is it likewise divested of its barbarity and pernicious inclinations; it comes forth an entirely new creature, full of gaiety, alacrity, and vigour, and graced with a noble and majestic air.

The lion-ant, after remaining in its reptile state from one to two years, spins a thread, which, being glutinous, sticks to small particles of sand, in which it rolls itself up like a ball. In the concave of this, it resides for six or eight weeks; and, gradually parting with its skin, feet, antennæ, and eyes, bites a hole in the ball, and appears in the form of a fly, having a brown slender body, a small head, large eyes, long legs, and transparent wings. The whole animal is, in its first state, of an unpleasing aspect; and, on a cursory view, bears a general resemblance to a flat-bodied spider. The genus *myrmelion* includes many species.

Libelloides: wings grey, spotted with brown; body spotted with black and yellow; it inhabits the Cape of Good Hope.

Pardalis: wings white, with scattered black dots; thighs yellow. It inhabits Coromandel.

Pantherinus: wings white, spotted with black; body yellow; abdomen variegated with black. This species is found in Austria, and other parts of Germany.

Lynceus: wings hyaline, with a black marginal spot at the tip, in the middle of which is a tawny one. It inhabits Sierra Leone.

Formicales: wings clouded with brown, with a white marginal spot. This species is better understood than any other of the genus *myrmelion.*

Catta: wings hyaline, with faint brown spots; the nerves are spotted with black. Found in Madeira.

Phactatus: wings hyaline; the nerves, with alternate black and white spots. It inhabits India.

Formica lynx: wings immaculate; body brown: margin of the thorax and legs yellow. It inhabits New Holland.

Caninus: wings hyaline, immaculate; body brown; head and thorax spotted with yellow. It is found in Guinea.

Barbarus: wings reticulate, yellowish hyaline, with two brown spots. It inhabits Europe and Africa.

Longicornis: Upper wings hyaline, with a double yellow spot at the base; lower ones yellow, black at the base. It inhabits Italy.

Capensis: wings white, reticulate with black; the tail is forked. It inhabits the Cape of Good Hope.

Appendiculatis: wings white, immaculate, one-toothed at the base. Its country is not known. There is a specimen in the British Museum.

Australis: wings white, with a black marginal spot; the body is variegated. It inhabits the southern parts of Europe.

Cayennensis: wings white, with a snowy marginal spot. It inhabits Cayenne.

Gosse says, "The manners of the Jamaica ant-lions agreed minutely with those of the *myrmelion formica-*

rius of the south of France, as recorded by the accurate Reaumur.

Lizards are also among the enemies of ants.

Ainsworth says, in his Travels in Asia Minor, "Lizards came out in the evening, and were especially useful in killing ants."

Mrs. Griffith, writing from Malta, says—"J. brought home with him to-day a very pretty little bird, called the 'Queen,' or 'Ant-eater;' the latter name referring to its singular manner of obtaining its livelihood. It lays itself down on the ground, in the neighbourhood of its prey, and remains quite motionless, feigning death, but, at the same time, hanging its long tongue out. The ants, attracted by a glutinous moisture peculiar to it, are soon brought around; and when there are a sufficient number collected, the bird suddenly draws in its tongue and swallows the repast."

"The ant-eater fly frequents the meadows and bushes in France and Italy, during the latter part of summer, and is so exceedingly rapacious, that it seizes on everything which comes in its way."—*Martyn's Dictionary.*

LIST OF SPECIES OF ANTS AS ENUMERATED IN REE'S CYCLOPÆDIA.

From Linnæus, Geoffroy, Fabricius, La Mark, and Latreille.

Herculanea: black, abdomen ovate, legs ferruginous.

Formica magna of Linnæus: large, lives in the trunks of decayed trees in Europe.

Compressa: black, thorax compressed, tip of the antennæ and thighs rufous, head very large; native of Tranquebar. The abdomen is ovate; the scale entire; thorax immaculate.

Smaragdina: green, thorax lineated with yellow; inhabits India, and is of a large size; the antennæ reddish at the tip; wings large and white, with ferruginous nerves.

Rufipes: hairy, black, legs rufous; described from the Banksian Cabinet. The head is large, ovate, rough with ferruginous hair; antennæ brown at the tip; scale of the petiole ovate-obtuse.

Bicolor: black, scutel, abdomen and legs ferruginous; large; inhabits Barbary.

Erythrocephala: deep black, head rufous, scale of the petiole double; native of New Holland. The head large and oblong, antennæ rufous, thorax filiform, legs black, at the ends rufous.

Barbara: deep black; head, antennæ and ends of the legs ferruginous; petiole with two tubercles; inhabits Africa; size that of *herculanea;* head large; first joints of the antennæ large and black.

Didyma: black, abdomen greyish, scale of the petiole double; an European species, found chiefly in Italy. The size is moderate, pitchy, thorax gibbous, abdomen covered with circrous down, scale double, or widely emarginate; legs black.

Viatica: ferruginous, abdomen ovate and black; the mandibles are blackish at the tip, thorax compressed; ferruginous, with a single tubercle; hind-legs very long, with brown shanks. This species inhabits Spain, and is the same size as the last.

Pallipes: deep black and glossy, antennæ and legs whitish; small; head small and roundish, thorax gibbous, scales of the petiole truncated, and nearly emarginated; wings white; native of Cayenne.

Ægyptiaca: black, thorax rufous, two-toothed behind, petiole with two tubercles; head large, and brown; antennæ ferruginous, thorax compressed, legs ferruginous, with sub-clavated thighs; a small species, found in Egypt.

Binodis: black, head very large, and rufous, petiole of the abdomen bituberculated; native of Egypt; legs rufous, thighs ferruginous.

Rufa: black, thorax compressed, and with the legs ferruginous; thorax compressed, entirely ferruginous, head and abdomen black; inhabits Europe. Another of the same name of a blood-red.

Pubescens: black, abdomen pubescent; native of Calabria and Hungary; in size resembles the last.

Nigra: glossy black, tail piceous; an European insect.

Fusca: greyish brown and polished, antennæ and legs ferruginous, wings white; inhabits Europe.

Flavescens: yellowish, abdomen darker, with a black dorsal line; native of Cayenne. In this species the scale of the petiole is entire.

Melanocephala: pale, head and back of the thorax black. Like the last, this insect inhabits Cayenne; it occurs in immense numbers at certain seasons, and commits vast depredations, consuming and destroying every kind of provision.

Rubra: testaceous, eyes, and dot under the abdomen black; an European species.

Cinerascens: black, head rufous, abdomen greyish. A large species found in Tranquebar: the head is rufous, mandibles and antennæ black, abdomen ovate, greenish-grey, with a black angle behind the middle; wings dusky.

Fœteus: oblong, black, tail rufous, scale of the petiole somewhat cylindrical and obtuse; named *fœteus* from its offensive smell. The species is of a large size; preys on other ants, and inhabits Guinea.

Elongata: oblong, rufous, abdomen and legs paler; a ferocious species found in Tranquebar; the head is large, mandibles black, thorax elongated and compressed, scale forming an ovate tubercle in the middle of the petiole.

Guttata: oblong, black; abdomen, with three dots each side; antennæ and legs rufous; the mouth is rufous; scale ovate, obtuse, and entire; wings whitish, with a marginal black spot. Inhabits Santa Cruz.

Albipennis: oblong, pale; thorax black behind; abdomen reddish; the scutel is white; scale of the petiole ovate, gibbous; wings white, with a black marginal dot. Inhabits same country as the former.

Rufibarbis: oblong, black; mouth and thorax rufous. Native of France.

Obsoleta: above, black; beneath, red; testaceous; abdomen black, with four snowy dots; the head is black; antennæ ferruginous; scale of the petiole short, obtuse; legs ferruginous, thighs black. Inhabits Alsace.

Virescens: pale; head and abdomen greenish. Described from the Banksian Cabinet. The petiole is long, with a small raised tubercle. This insect inhabits New Holland.

Saccharivora: black; antennæ, mandibles, and legs, rufous. A native of the American islands, and is very destructive to the sugar cane, in which it forms its nest.

Maculata: black; posterior part of the thorax and thighs ferruginous; abdomen with pale spots at the sides: the head is large: mandibles with many teeth; antennæ piceous at the tip; abdomen ovate and hairy. Inhabits Africa.

Antiguensis: testaceous; abdomen black at the tip; the petiole with two tubercles. Native of Antigua.

Guinensis: Ferruginous; abdomen black, legs yellowish. A small species, found in Guinea.

Omnivora: thorax rough, with raised dots; petiole with two tubercles; body testaceous; abdomen very minute. Native of Surinam.

Flava: yellow; abdomen ovate and pubescent. An European species.

Cæspituca: black; petiole of the abdomen with two tubercles; scutel bidentated. In dry meadows under moss in Europe. The winged ants of this species fly abroad in swarms, like the dog-fly, when the weather is serene.

Tubernea: rufous; head black; abdomen with a black band, the petiole with two tubercles; the antennæ black at the tip, and the thorax bidentated behind. Inhabits Sweden; less than the former.

Vagans: rufous; head, and back of the abdomen, brown; thorax two-spined behind; petiole with two tubercles, twice the size of the former; the head globular; antennæ ferruginous. This species inhabits Saxony.

Accevorum: rufous; head and abdomen black; thorax two-spined behind; petiole with two protuberances. Resembles the last. The antennæ and mandibles rufous; legs ferruginous. Native of Denmark.

Unispinosa: black; antennæ and legs rufous; scale of the petiole, with a single spine; mandibles projecting, and parallel; the body is elongated; head large, grooved in front; abdomen ovate and black; legs red. Inhabits Guadaloupe.

Grosse: blackish; thorax bidentated under the scutel; abdomen large and globular; the antenna is pitchy, with the tip grey; head pitchy, sub-spinous each side;

wings ferruginous. Native of Cayenne. This species is large.

Australis: black; thorax unarmed; scale of the petiole with two spines; the body entirely covered with cincrous down. Native of New Holland.

Bidens: thorax with two-toothed tubercle; head ovate; antennæ ferruginous, the first joint black. Inhabits Surinam.

Biscutata: thorax bidentated; scale of the petiole double; head pointed each side behind; abdomen globular, with a black dorsal line; wings sub-ferruginous. Native of Cayenne.

Clavata: black; thorax two-toothed; petiole one-toothed beneath. A large species, found in India; the thorax is gibbous; the petiole with a large tubercle, and spine beneath; abdomen ovate, first segment globular.

Arenaria: thorax impressed behind, and bidentated; body black; ends of the legs pitchy. Inhabits the moveable sands of Barbary. The head is large and ovate: thorax compressed; the petiole with two tubercles: abdomen somewhat globular and downy.

Attelaboides: black; thorax two-spined; head tapering behind; legs ferruginous. A Brazilian species in the Banksian cabinet. The head is rough and black; thorax slender, black; abdomen brown and downy.

Megacephala: thorax two-spined behind; ferruginous; abdomen black; head very large. Inhabits the Isle of France. The species is small: head ovate, and larger than the whole body; antennæ and legs ferruginous; petiole with two tubercles.

Amnion: thorax armed with two spines; petiole of the abdomen with two incurvated spines; the head is small and ovate; thorax and abdomen black, with gold down on the back; legs black. Native of New Holland.

Bitamata: thorax four-spined; petiole of the abdomen with two curved spines; the head is small and round; the antennæ long; abdomen sub-globular; black at the base, ferruginous; ferruginous; legs long and black; thighs ferruginous. Inhabits India.

Militaris: thorax bi-spinous before; scale of petiole armed with four spines. An African species. The head is large; gibbous, black, and carinated each side between the antennæ; antennæ globular, black, and downy; wings brown.

4 *Dens:* thorax quadridentated; body black; head with a double carinated ridge. Native of Cayenne. The spines on the thorax placed two before and two behind.

Sexdens: thorax armed with six spines; head very large, double, and armed with a spine each side behind. Inhabits America.

Cephalotes: thorax four-spined; head large, double, and armed with a spine each side behind. Native of South America, which it inhabits in prodigious number, and is extremely destructive in the plantations.

Atrata: thorax four-spined; body black; head depressed, marginal, and armed behind with two spines. Inhabits same country as the former, and is, like that species, exceedingly injurious.

Galosa: rufous; abdomen black at the tip, the first segment contracted; mandibles projecting. An Australian species.

Forficata: brown; abdomen pubescent and black, the first segment contracted; mandibles projecting; head large and flat, mandibles forked and toothed within; thorax compressed in the middle; petiole with a globular tubercle; legs dull ferruginous. Inhabits New Holland.

Maxillosa: thorax six-toothed, head yellowish; the mandibles as long as the head. Native of India. The head is large, and abdomen brown.

Rostrata: thorax compressed, three-toothed before; mandibles projecting and incurved. A small species found in Cayenne.

Hamata: ferruginous; head very large and pale; mandibles projecting and hooked. Head with a small conic spine each side at the base; mandibles longer than the head, black and hooked at the tip, the base ferruginous; petiole with two tubercles.

Hæmatoda: scale of the petiole conic, and very acute; head nearly double, the mandibles projecting. The mandibles are toothless, and of a rufous colour; the head reddish, thorax unarmed and black; wings hyaline. This species inhabits America.

Pharonis: rufous; abdomen brownish. A very minute species found in Egypt.

Salomonis: red; abdomen black and somewhat villous. Native of Egypt and Arabia.

Fœtida: petiole with transversely compressed tubercles; first segment of the abdomen contracted; mandibles projecting; the head is black, with three raised dots; the abdomen and legs hairy. This inhabits America.

Vaga: black; abdomen ovate and hairy. Native of Europe, and lives in decayed trees under the bark.

Venosa: head and thorax black; abdomen cylindrical and brown; scale of the petiole thick and entire; legs testaceous; wings white, with testaceous veins, and a brown marginal spot. Country unknown.

Melanopis: rufous; eyes black, abdomen brown on the back; scale of the petiole entire. This, and the four following species are natives of Europe.

Glabra: black, glabrous; scale of the petiole bidentated; incisures of the abdomen whitish; legs rufous.

Testacea: testaceous brown, and somewhat downy; antennæ and legs brown; wings white, with a ferruginous base.

Fuscascens: black; head as wide as the abdomen; scale of the petiole very short; mouth, antennæ, and legs, reddish brown.

Ruficornis: head and thorax black; abdomen brown; jaws, antennæ, and legs, testaceous; wings hyaline.

From Huber, not named in the Encyclopædia.

Fuliginosa, the fuliginous ant: short, very black, shining; antennæ, at their geniculation, knees, and tarsi, of a testaceous brown; length one line three quarters. This species constructs admirable labyrinths in trees.

Brunnea, or brown ant: deeply ferruginous; length, one line two-fifths. This is the most skilful of the indigenous mason ants.

Myrmica rubra, or red ant: slightly shagreened;

upper part of the abdomen blackish; constructs its nest in the earth, or in trees. It emits a very pungent odour, and lives by rapine.

Formica fusca, or dark ash-coloured ant: base of the antennæ and feet reddish, or ferruginous. Inhabits Europe. These open the cocoons of their pupæ a few days after they have spun, under the form of larvæ, and are exposed to the invasion of the amazon ants.

Cunicularia, or mining ant: head and abdomen black; about the mouth, upper part of the head, first joint of the antennæ, thorax and feet, of a pale fallow. These, like the ash-coloured ants, tear the cocoons spun by the larvæ, as soon as the latter have undergone their transformation.

Formica rufescens, or rufescent ant, called by French naturalists *formice ambigue*, because it holds an intermediate rank between two other families. It is of a pale red colour, three lines in length. The female is of a blood-red colour.

Formica sanguinea, or sanguine ant: blood-red. The winged ones have their wings smoky towards their base.

ANTS FOUND IN GREAT BRITAIN AND IRELAND.

Herculanea: horse-ant. Abdomen oval, thighs red-brown. Much larger than the common ant.

Rufa: front and thorax yellowish, the rest red-brown; length, three lines. In gardens.

Fusca: common ant. Brown, polished; wings white, larger than the body. Length, two-and-a-half lines.

Nigra: black; wings brownish on the upper part, and larger than the body. One-and-a-half line.

Rubra: little red ant. Clouded, with a black spot under the abdomen; eyes black, very small. Forms a lodging in trees.—J. Birkenhout's *Outlines of the Natural History of Great Britain and Ireland.*

Formica fuliginosa: makes its nest in trees. Black ant. Is an insect of a powerful and penetrating scent, which it imparts to everything with which it comes in contact.—*Kirby and Spence.*

The wood in which ants of this species excavate these labyrinths takes a blackish hue; and at the foot of trees inhabited by fuliginous ants, Huber observed a very abundant and blackish liquid. The vegetation of these trees does not appear, in the slightest degree, affected by the labours of these insects, although they excavate labyrinths within their trunks.

THE CONEY.

AFTER searching through innumerable works, and consulting various authorities in natural history, in order to decide on the animal intended in these words, "The conies are but a feeble folk, yet make they their houses in the rocks," the compiler finds it very difficult to form a decided opinion. In many works, it is asserted to be the rabbit; in others, with equal certainty, the jerboa; others name the ashkoko, or Daman Israel. Some account will be given of these three; and the reader will, it is hoped, be better able to give, or at least to hold, a more correct opinion than he could, without being aware of their respective habits, appearance, &c., of these animals. There is, at any rate, one advantage in uncertainty—that the young may be deterred from pronouncing hastily, where others, older and wiser, hesitate.

This animal is named several times in the Holy Scriptures. In the first quotation, from Levit. xi. 5,

THE CONIES are but a feeble folk, yet make they their houses in the rocks.
PROV. xxx. 26.

some account of its appearance and habits is conveyed: "And the coney, because he cheweth the cud, but divideth not the hoof: he is unclean unto you." The same injunction is repeated in Deut. xiv. 7. In Psalm civ. 18, their place of refuge is named, "The high hills are a refuge for the wild goats, and the rocks for the conies."

It is this fact which appears to the compiler to form the chief centre of interest, while collecting accounts of this animal; for in its feebleness man finds his own likeness; and in its wisdom, his example. For is not *He* the Rock, whose work is perfect, a finished work, in which we are called to trust for forgiveness, righteousness, and strength? Is it not he who "stands on this Rock, whom He covers with His hand?" (Exod. xxxiii. 21, 22,) and who, thus "brought near, acknowledges His might" (Isaiah xxxiii. 13); and therefore "walks righteously, speaks uprightly, despises the gain of oppression, shaketh his hands from holding of bribes, stoppeth his ears from hearing of blood, and shutteth his eyes from seeing evil. He shall dwell on high; his place of defence shall be the munitions of rocks; bread shall be given him; his waters shall be sure. His eyes shall see the King in His beauty; they shall behold the land that is very far off."

> "Rock of ages, cleft for me,
> Let me hide myself in Thee!"

How pleasant to us to find our Divine Creator's works calling us with so many sweet, harmonious voices, to "hear Him in all things." Truly in exercising ourselves to do so, it "tunes the listening ear." And in this way may the study of this little animal's habits thus interest, and thus influence us!

THE RABBIT, OR CONEY.

SYNONYMS.—*Lepus Cuniculus,* Linnæus.—*Lapia Sauvage,* Buffon.—*Coney,* Ray.—Shaw's General Zoology, Bewick's Quadrupeds, 341, 343.

The rabbit, or coney, says Bingley, lives in holes in the earth, where she brings forth her young. A short time previous to this event, if she does not find a hole suited to her purpose, she digs one; not in a straight line, but of a zig-zag form. The bottom of this she enlarges every way, and then, with a quantity of hair which she pulls from her own body, she makes a warm and comfortable bed for her young. During the whole of the first two days, she never leaves them, except when pressed by hunger; and then she eats with surprising quickness, and immediately returns. She always conceals them from the male, lest he should devour them; and therefore, when she goes out, she covers up the hole so carefully, that its place is scarcely perceptible to the eye. In this manner she continues her attention for about a month; at the end of which period the young are able to provide for themselves. Notwithstanding the unaccountable propensity which the male has to devour them when very young, yet when they are brought by the mother to the mouth of the hole, to eat such vegetables as she gets for them, he seems to know them, takes them betwixt his paws, smooths their hair, and caresses them with great tenderness.

Rabbits, as they cannot easily articulate sounds, and are formed into societies that live under ground, have a singular method of giving alarm. When danger is threatened, they thump on the earth with one of their hind feet, and thus produce a sound that can be heard a great way by animals near the surface.

The prevailing colour of the European rabbit is grey, *i. e.*, a mixture of tawny black and ash-colour; but there are frequently black ones, white, and mottled, also some of a fawn colour.

In Hakluyt's Voyages it is said,—"They (the Tartars) have certaine little beasts, called by them *sagur;* which lie in a cave, twenty or thirty of them together, all the whole winter, sleeping there for the space of five months, and these they take in great abundance. There are also a kind of conies, having long tayles like unto cats; on the outside of their tayles grow black and white haires. They have many other small beasts, good to eat, which they know and discern right well."

And again,—(In Chaldee) "There be mice, *i. e.*, rabbits as bigge as our country dogs, and, therefore, they are hunted with dogs, because cats are not able to encounter them."

There are native rabbits in almost every part of Asia. They delight in excessive heat.

The wild rabbit of Africa is of a russet hue, like the European breed. The species is confined to the Mediterranean shores of that continent.

"One rabbit," says the Père du Tertia, in his General History of the Antilles, "was early introduced into the American islands, and succeeded well."

Sir Richard Philips says that "rabbits do not burrow in hot climates. They have centinels to give warning of danger, chiefly females, who enter the holes last."

The following remarkable instance of ingenious contrivance in concealment and defence, in the absence of natural advantages, is reported of the *conilurus constructor*, or native rabbit of Australia, a smaller animal than the English rabbit, and differing still more in being furnished with a long tail. The account is derived from observations made by Major Mitchell, as given in the eighteenth volume of the Transactions of the Linnæan Society.

"We had frequently, during the course of our travels, remarked large piles of dry sticks and brushwood, each of them big enough to make two or three good cart-loads, collected and heaped together in different situations, and evidently designed for some particular purpose. For a long time we imagined them to be the work of the natives, who are in the habit of communicating the intelligence of any strange or uncommon event to distant tribes, by raising dense columns of smoke in different directions over the face of the country; and we fancied that these were their rude telegraphs, kept ready for immediate use, when an occasion seemed to require it. A more minute examination, however, soon convinced us of our error; we found, in fact, that the materials were not thrown promiscuously together, as would naturally have been the case had they been collected by the natives for the purpose of burning, but that each stick and fragment was so curiously intertwined and woven with the rest, that the whole formed a solid, compact mass, so firmly bound together, that it was absolutely impossible to remove a part without at the same time moving the whole fabric. Our kangaroo dogs also drew our attention more particularly to the examination of those curious structures, by the constant ardour they displayed in barking and scratching whenever we fell in with them, thus manifestly intimating that they expected to find something inside. At length we broke several of them open, a work of no small difficulty, from the solidity of their structure, and were not a little surprised to find in the interior a small nest occupied by an animal something between a rabbit and a rat, which had constructed this formidable and massive stronghold to protect itself against the attacks of the native dog. For this purpose the little animal chooses some small bush or shrub as a fixed *point d'appui*, to commence its operations; and by working round this, and interlacing the materials of its fortalice, first of all with the growing branches of the centre bush, and afterwards with one another, *gradually* extends it to the enormous dimensions already specified, and enjoys the reward of its perseverance and ingenuity in subsequent security and repose."

The rabbit has been introduced into the Falkland Islands, and has succeeded very well, so that they abound over large parts of the island. I should not have supposed that these animals, natives of Northern Africa, could have existed in a climate so extremely humid as this, and which enjoys so little sunshine that even wheat ripens only occasionally. It is asserted that in Sweden, which any one would have thought a more favourable climate, the rabbit cannot live out of doors. The French naturalists have considered the black variety a distinct species, and called it "*Lepus Magellanicus*." We find these little animals in every quarter of the globe; therefore we cannot assign to them a peculiar *place*, and their *name* is often changed by many authors into coney, although we cannot think it to be the coney of the Scriptures, its habitation being generally in the earth, or sand, rather than in rocky places..

THE JERBOA TRIBE.

SYNONYMS.—*Dipus Jaculus*, Linnæus.—*Mus Jaculus*, Lynnæan System. —*Egyptian Jerboa*, Pennant.—*Jerboa*, Bruce.—*Jerboas*, Sonnini.—*Gerboa*, or *Daman Israel*, Shaw's Travels.—*Geibrise* et *Alagtaga*, Buffon; Erdhaare; Gmelin's Travels; Shaw's General Zoology, pl. 158; Bewick's Quadrupeds, 364.

The jerboas seem, in many respects, both of conformation and habit, much allied to the kangaroos, but an adherence to artificial system will not allow them to be arranged together. They use their long hind-legs in leaping, very seldom going on all-fours; and with their fore-legs they both carry their food to their mouth, and make their holes in the ground. They are inhabitants principally of the warmer climates. They burrow *in the ground*, and leap, with the agility of a grasshopper, the distance of seven or eight feet at a time. This does not seem like "feeble folk."

They have two front teeth above and two below. The fore-legs are short and the hind ones very long, and they have clavicles or collar-bones.

The Siberian Jerboa.—This species is found in different parts of the eastern deserts of Siberia; it also occurs in Barbary, Syria, and some parts of Tartary, but seldom in great plenty. It is of a pale, yellowish fawn colour on the upper parts, and white beneath.

The length of the body is about eight inches, and of the tail ten. It very much resembles the Egyptian jerboa, except in the hind-feet, each of which has five instead of three toes.

The jerboas inhabit dry, hard, and clayey *ground*. They *dig* their *houses very speedily*, not only with their fore-feet but with their teeth, and fling the *earth* back with their hind-feet, so as to form a heap at the entrance. The burrows are many yards long, and run obliquely and winding, but not above half a yard deep below the surface. They end in a large space or nest, the receptacle of the purest herbs. They have usually but one entrance; yet, by a wonderful sagacity, the animals work from their nest another passage, to within a very small space from the surface, which, in case of necessity, they can burst through, and so escape.*

The sands and rubbish which surround modern Alexandria are much frequented by the jerboas. They live there in troops, and, in digging the *ground*, are said to penetrate even through a stratum of softish stone, which is under the layer of sand. Though not actually wild, they are exceedingly restless, the slightest noise, or any new object whatever, makes them retire to their holes with the utmost precipitation.

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* Penn. Quad., ii. 430.

It is almost impossible to kill them, except wh they are taken by surprise. The Arabs have the art catching them alive, by stopping up the outlets to t different galleries belonging to the colony, one cepted, through which they force them out.

They walk only on their hind-legs, the fore-l being very short; and, on the approach of any dang they immediately take to flight, in *leaps six or se feet high*, which they repeat so swiftly, that a m mounted on a good horse can scarcely overtake the They do not proceed in a straight line, but run fi to one side and then to the other, till they find eit their own burrow or some neighbouring one. In le ing, they bear their tails (which are longer than th bodies) stretched out. In standing or walking, th carry them in the form of an S, the lower part touchi the ground, so that it seems a director of their motio When surprised they will sometimes go on all-fou but they soon recover their attitude of standing their hind-legs, like a bird. When undisturbed, th use the former posture, then rise erect, listen, and h about like a crow. In digging or eating, they drop their fore-legs; but in the latter action, they often up also like a squirrel.

The Arabs of the kingdom of Tripoli, in Africa, tea their greyhounds to hunt the antelope, by first instructing them to catch jerboas; and so agile are these little creatures, that Mr. Bruce has often seen, in a large court-yard or enclosure, the greyhound employed a quarter of an hour before he could kill his diminutive adversary; and had not the dog been well-trained, so as to make use of his feet as well as his teeth, he might have killed two antelopes in the time of killing one jerboa.

In their wild state, these animals are fond of tulip-roots, and nearly all the oleaginous plants; but in confinement, they do not refuse raw meat. They are the prey of most of the smaller rapacious beasts. It requires no difficulty to tame them, but it is necessary that they should be kept warm. They are so susceptible of cold, as to foretell bad weather by wrapping themselves close up in their cage, before its commencement; and those that are abroad, always, on those occasions, stop up the mouths of their burrows. They sleep during the winter, but a warm day sometimes revives them. On the return of the cold, they retreat again to their holes.

Mr. Sonnini fed for some time while he was in Egypt, six of these animals, in a large cage of iron wire. The very first night, they entirely gnawed asunder the upright and cross sticks of their priso and he was under the necessity of having the inside the cage lined with tin. They were fond of baski in the sun; and the moment they were put in t shade, they clung to each other, and seemed to suf from the privation of warmth. They did not usua sleep during the day, although the contrary is usua asserted. Though they had much agility in their mo ments, gentleness and tranquillity seemed to form th character. They suffered themselves to be strok with great composure, and never made a noise, quarrelled, even when food was scattered among the No distinguishing symptoms of joy, fear, or gratitu were discoverable.

It is very difficult to transport these little creatu into other climates; but those who attempt it shou take the precaution to enclose them in strong cages; their nature disposes them to gnaw whatever comes the way; so that being able to eat through the har est wood, they occasion considerable damage to a sh in the course of her voyage, and even endanger h sinking. . . . They breed several times in the summ and bring seven or eight young at a time. The Ara eat them, and esteem them among their great delicacies. These animals are hunted with greyhoun by the Arabs in the kingdom of Tripoli. The Prince of Tunis presented Bruce with a trained greyhound, which afforded him excellent sport in that way.

The *dipus cafer*, or Cape jerboa, now referred by naturalists to the genus *helamys*, is the largest of the tribe. It measures one foot two inches from nose to tail, and the tail is fifteen inches long. This species is remarkable for its great strength and activity. It will spring from twenty to thirty feet at a single bound; and inhabits the mountainous countries to the north of the Cape of Good Hope. It is called the *springen haas*, or jumping hare, by the Dutch colonists.

The *caira aguti*, or Indian coney, is of the size of the rabbit; the body plump, and thicker behind than before. The head rather small, and somewhat compressed laterally; snout long, and rather sharp; nose divided at the tip; and the upper jaw longer than the lower; ears short, broad, naked, and rounded; neck rather long, but thick; legs thin, almost naked, and blackish, the hind-legs larger than the anterior ones, and furnished with only three toes; tail extremely short, naked, and sometimes scarcely visible; the whole of the animal covered with hard, strong, and shining hair, in general of a rufous brown colour, with blackish freckles.

There are three varieties of the Indian coney: the *agouti cunicularis*, or lesser agouti; the *agouti leporina*, or larger agouti; and the *agouti Americana*, or American agouti. Buffon observes, that the agouti has the hair, grunting, and voracious appetite of the hog; and, when fully satiated, hides the remainder of his food, like the fox, in different places. It takes delight in gnawing and spoiling whatever it comes near. When irritated, it bites fiercely, its hair stands erect along the back, and it strikes the ground violently with its hind-feet. It does not dig holes, like the rabbit, but lives in the hollows of trees. Roots, potatoes, yams, and fruits are its principal food. It uses its fore-paws, like the squirrel, in carrying food to its mouth; runs swiftly up hill, or on even ground; but its fore-paws being shorter than its hinder ones, it is in danger of falling, upon a declivity. The flesh of the agouti being nearly as good as that of the rabbit, and the skin of such a desirable quality, as to form an excellent upper leather for shoes, the hunting of these animals is an object of attention among the Indians. They commonly go in search of them with dogs, or take them in traps; the natives know also how to allure them by whistling, or imitating their cries, and kill as many as they please. The young agouti is easily tamed.

When in a wild state, they usually dwell in the woods, where the female chooses the most obscure parts, and there prepares a bed of leaves and grass for her young. A day or two after their birth, she carries them in her mouth, like a cat, into a hollow of some tree, where she suckles them for a short space of time, and they are soon in a condition to run about, and provide for themselves. They multiply as fast as rabbits, producing three, four, and sometimes five young ones, during every season of the year. When in a domestic state, they never remove to any great distance, and always return to the house; but constantly retain somewhat of their wild disposition.

Henderson says, "This animal, in size, form, and habit, is very like the hare. It does not run, but leaps; and, whilst in the act of listening, it rears itself on the hind legs, exactly in the same way. The meat of it is wholesome, but exceedingly dry."

The Cape jerboa, *Helamys Capensis,* called by the colonists *spring haas,* springing hare, is of a brownish colour, and about the size of a small kangaroo, to which, in figure, it bears considerable resemblance. It is a troublesome animal in cultivated grounds, which it visits in the night, to feed among the corn and other crops.

In describing the dresses of the king's wives at Lattakoo, in southern Africa, we are told, "Their cloaks were composed of alternate stripes of the skin of the jerboa and the genet cat."

The great Abyssinian traveller, Bruce, well observes that the best use that can be made of researches into natural history is to throw light on sacred Scripture and with this remark he prefaces the following very interesting account of the jerboa, which it appears to the compiler should completely satisfy the reader that this little animal is *not* the coney of the Psalms and the Proverbs. "If," says Bruce, "the rabbit has been frequently confounded with the shaphan, and stood for it in the interpretation of the Hebrew text, the same has likewise happened to another animal, the jerboa, still more dissimilar in form and in manners from the shaphan, than even the rabbit itself, and much less known. The jerboa is a small harmless animal of the desert, nearly the size of a common rat; the skin being smooth and shining, of a brown, tinged with yellow, or gold colour; and the ends of the hairs tipt with black. It lives in the smoothest plains or places of the desert, especially where the soil is fixed gravel, for in that it chiefly burrows, dividing its hole below into many mansions. It seems to be apprehensive of the falling-in of the ground; it therefore generally digs its hole under the root of some spurge, thyme, or absynthium, upon whose root it seems to depend for its roof not falling in, and burying it in the ruins of its subterraneous habitation. It seems to delight most in those places that are haunted by the *ceraster*, or horned viper. Nature has certainly imposed this dangerous neighbourhood upon the one for the good and advantage of the other, and that of mankind in general. Of the many trials I made, I never found a jerboa in the body of a viper, excepting once in that of a female with young, and the jerboa itself was then nearly consumed."

The jerboa, for the most part, stands upon his hind-legs; he rests himself by sitting backwards sometimes, and he is seen, though rarely, as it were, to lie on all-fours: whether that be a natural posture, or whether from fatigue or sickness, is not ascertained. The jerboa of the Cyrenaicum is six inches and a quarter in length; but appears, when dead, full half-an-inch longer. The head, from his nose to the occiput, is one inch two lines. From the nose to the foremost angle of the eye, six lines. The opening of the eye itself is two lines and a quarter; his ears, three quarters of an inch in length, and a quarter of an inch in breadth; they are smooth, and have no hair within, and but very little without: of an equal breadth from bottom to top, do not diminish to a point, but are rounded there. The buttocks are marked with a semicircle of black, which parts from the root of the tail, and ends at the top of the thigh. This gives it the air of a compound animal, a rat with bird's legs, to which the flying posture still adds resemblance. From this stroke to the centre of the eye is three inches, and to the point of his toe the same measure; his tail is six inches and a quarter long, seems awkwardly set on, without any apparent connection with his spine; half of it is poorly covered with hair, the middle white, the edges jet black; this tail, which by its length would seem an encumbrance to him, is of a surprising advantage in guiding and directing him in his jumping. From the shoulder to the elbow of the fore-foot is half-an-inch; from the elbow to the joining of the paw, five-eighths of an inch. The claw itself is curved, and is something less than a quarter of an inch. It has very long moustaches, some of them standing backward, and some of them forward from his nose; they are all of unequal lengths, the longest is an inch-and-a-half; his belly is white, he seems to be of a very cleanly nature; his hair always in great order. From his snout to the back part of the opening of his mouth, is half-an-inch; his nose projects beyond his under jaw three-quarters of an inch. He has four toes in his hind-foot, and a small one behind his heel, where is a tuft of hair coloured black. The fore-foot has three toes only. The ancients have early described this animal; we see him in some of the first medals of the Cyrenaicum, sitting under an umbellated plant, supposed to be the silphium, whose figure is preserved to us on the silver medals of Cyrene. The high price set upon it is mentioned by several historians; but the reason of that value, or the use of the plant, I have never yet been able to comprehend. I suppose it was an adventitious plant, which the curiosity and correspondence of the princes of that state had probably brought from some part of negro land, where the goats are browsing upon it at this day with indifference enough, unconscious of the price it bore in the time of the Ptolemies.

Herodotus, Theophrastus, and Aristotle, all mention this animal under the name signifying two-footed rats. This animal is found in most of the parts of Arabia and Syria, in every part of the southern deserts of Africa, but nowhere so frequently, and in such numbers, as in the Cyrenaicum, or Pentapolis. In my unfortunate journey there, I employed the Arabs, together with my servants, to kill a number wit sticks, so as that the skins might not be injured b shot. I got them dressed in Syria and in Greece, an sewed together, making use of the tail as in ermin for the lining of a cloak, and they had a very goo effect; the longer they wore, the glossier and fin appearance the skins made. The jerboa is very f and well coloured; the buttocks, thighs, and part the back, are roasted, and eaten by the Arabs; they a not distinguishable from a young rabbit, either i colour or taste; they have not even the strong tast the rabbit has. Some writers have confounded the two animals together, at least they have mistaken th for the shaphan, and the shaphan for the rabbit. Thi however, is plainly without foundation. Their lo legs, and the necessity of leaping, demand the plai ground, where nature has always placed this creature

The Arabs Ibn Bitar, Algiahid, Alcamus, and Dami and many others, have known the animal perfectl though some of them seem to confound it with anothe called the ashkoko. Ibn Algianzi says, that the jerb is the only kind that builds in rocks, which from t thousand examples I am sure he does not, nor is any way made for it, and I am very certain he is n gregarious. They have a number of holes indeed in the same place, but I do not remember ever to have seen more than two together at a time. The Arab canonists are divided whether or not he can be lawfully eaten. Ibn Algianzi is of opinion he cannot, nor any other animal living under the ground, excepting the land crocodile, which he calls *el dabb*—a large lizard. Several others expressly say, that the eating of the jerboa is lawful. But this seems to be an indulgence, as we read in Damir, that the proof this animal is granted, because the Arabs delight in it. And Ibn Bitar says, that the jerboa is called Israelitish, that the flesh of it is dried in the outward air, and is very nourishing. Such, however, was not the opinion of the old translators of the Arab version from the Hebrew; they once only name this animal expressly, and there they say it is forbidden. The passage is in Isaiah lxv. 17: "They that sanctify themselves and purify themselves in the gardens behind one tree in the midst, eating swine's flesh, and the abomination, and the mouse, shall be consumed together, saith the Lord." The Hebrew word signifies mouse, and so our English translation renders it. But the Arabic version calls it expressly the jerboa, and classes it with the abomination and swine's flesh, that is the class of things in the highest degree forbidden

There is little variety in this animal, either in or colour, in the wide range that they inhabit. Tow Aleppo they have broader noses than the African o their bodies also thicker, and their colour lighte thing we always see in the Syrian animals, comp to the African.

He goes by no other name in the east but that of boa, only the letter *j*, sometimes by being pronou *y*, for jerboa he is called yerboa, and this is the variation in name.

It is the character of the *shaphan*, given in Script that he is gregarious; that he lives in houses mad the rock; that he is distinguished in his feeble which he supplies by his wisdom:—none of these racteristics agree with the jerboa; and, there though he chews the cud in common with some ot and was in great plenty in Judea, so as to be know Solomon, yet he cannot be the shaphan of the S ture.

THE CONEY.

The Hebrew name of this animal is derived from a verb, which signifies to hide, and seems to indicate a creature of a timid and harmless disposition. Unable to avoid or encounter the various dangers to which it would be exposed in the plain, it seeks a shelter among the rocks, in the fissures of which it hides itself from the pursuit of its enemies. This circumstance is attested by the sacred writer in the Songs of Zion: "The high hills are a refuge for the wild goats, and the rocks for the shaphans." The choice which the shaphan makes of the rock for its place of abode is mentioned in the Proverbs, as a proof of sagacity: "The shaphans are but a feeble folk, yet make they their houses in the rocks." It is evident from these words also, that the shaphan is a gregarious animal, although they afford us no hints from which the numbers which constitute their little communities may be inferred. To what particular animal the name shaphan really belongs, has been much disputed among the learned. In our version, it is rendered by the word coney, or rabbit; in which our translators have followed the greater part of modern interpreters. Several circumstances seem to favour this interpretation; it is twice connecte law of Moses with the hare, as if it were a l animal; the noun in the plural is rendered h the seventy, in which they have been followed b ancient interpreters of great name: the meaning phan seems to correspond with the timidity of t bit; and it is certain that the rabbinical writers f interpreted the original word in this manner. I the rabbit is a gregarious animal, of a diminuti and found in great numbers in the plains o cho. But these facts are not sufficient to e the point, for which they are brought forwa instead of seeking a habitation in the fissures rocks, the rabbit delights to burrow in the downs. Sometimes, indeed, he digs a recept himself in rocky eminences, where the openi filled with earth; but he generally prefers a d in the sand—a situation for which he is e formed by nature. The words of David clearl that the instincts and habits of the shaphan a rally and constantly lead him to the rocks for as those of his associate compel him to rove am mountains. He does not allude to an occasior dence, but to a fixed and permanent abode; no wanderings of a few, but to the habitual choi whole species. But the rabbit as uniformly seeks the sandy plain as the wild goat the summit of the mountain.

"Gaudet effossis habitare cuniculis antris."—*Martial.*

The shaphan, according to its description in the Proverbs, discovers great wisdom and sagacity in retiring from the plain country, to the natural fastness which the Almighty Creator has provided for its reception; but it is no mark of wisdom in the rabbit, that he forsakes occasionally the sandy plain, which he is naturally formed to occupy, and retires to the rocks, which are so well-suited to his habits and manners. The wise man is also noting the sagacity of a whole species, not of a rambling individual; but this species is to be found on the plain, not among the rocks. Nor is the rabbit a feeble creature; he runs with considerable swiftness; and he is provided with the means of digging his burrow, which he employs with so great energy, particularly when alarmed by the approach of danger, that he buries himself in the sand with surprising rapidity. To exert his strength, according to existing circumstances, is all the sagacity which he discovers; and this, it must be admitted, is not peculiar to him, but common to the hare, the hedgehog, and many other animals. He betrays no foresight, except in p paring his dwelling; and he is never known to sup the want of strength by any contrivance. The s phan as described, both by David and the Prover exhibits a very different character, and, therefore, ca not be the same animal.

But if we apply these characters to the Daman Isra or as Mr. Bruce calls it, the *ashkoko*, the identity this animal with the shaphan of the Scriptures w instantly appear.* “The daman is a harmless creatu of the same size and quality with the rabbit, and wi the like in courting posture and disposition of the for teeth. But it is of a browner colour, with small eyes, and a head more pointed, like the marmots; t fore-feet likewise are short, and the hinder are near as long in proportion as those of the jerboa. Thoug this animal is known sometimes to burrow in t ground, yet he is so much attached to the rock, that is seldom or never seen on the ground, or from amo large stones in the mouth of caves, where he fixes constant residence. He is gregarious, as the wise m intimates, and lives in families; he is a native of Jude Palestine, and Arabia, and, consequently, must ha been familiar to the inspired writer. The character given of the coney in the Proverbs, chap. xxx., exactly corresponds with that which natural historians give us of the Daman Israel, which they represent as equally feeble in body and temper. The toes of his fore-feet very much resemble the fingers of the human hand; his feet are perfectly round, very pulpy or fleshy, liable to be excoriated or hurt, and of a soft fleshy substance.* They are quite inadequate to dig holes in the ground, much more to force their way into the hard rock. Unable or afraid to stand upright on his feet, he steals along every moment as it were apprehensive of danger, his belly almost close to the ground, advancing a few steps at a time, and then pausing, as if afraid or uncertain whether he should proceed. His whole appearance and behaviour indicate a mild, feeble, and timid disposition, which is confirmed by the ease with which he is tamed. Conscious as it were of his total inability to dig in the ground, or to mingle with the sterner beasts of the field, he builds his houses on rocks, more inaccessible than those to which the coney retires, and in which he resides in greater safety, not by exertion of strength, for he has it not, but by his own sagacity and judgment. He is therefore justly characterised a feeble animal, but exceeding wise.

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* Dr. Shaw's Travels, pp. 160-1.

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* Pliny, Hist. Natur. Ælian de Nat. Animal.

The Arabian writers confound the Daman Isr with the jerboa, which seems to be a species of ra It ruminates, builds its house on the rocks, or digs abode on the ground, but always in some high a rocky place, where it may be safe from the influx the waters, and the foot of the wild beast. If we m believe the Arabic writer quoted by Bochart, the diminutive animals discover no little sagacity in t conduct of public affairs, particularly in appointing leader, whose business it is to give them notice on th approach of danger, and who, in case of neglect, i punished with death, and succeeded by another mor attentive to their safety. Mr. Bruce, on the contrary contends, with great earnestness, that the habits of the jerboa are quite different from those ascribed in the Proverbs to the shaphan; and he asserts, that the jerboa always digs his habitation in the *smoother places o the desert*, especially where the soil is fixed gravel; fo in that chiefly he burrows, dividing his hole below int many mansions. He is not gregarious like the shaphan nor is he distinguished for his feebleness, which he supplies by his wisdom. Although, therefore, he ruminates, in common with some other animals, and abounds in Judea, he cannot be the shaphan of the Scripture. Hence, it is probable, that the Arabic writers improperly confounded the Daman Israel, or shaphan, and the jerboa; and it may be considered as nearly certain that the shaphan of Proverbs xxx., is not the rabbit, but the Daman Israel, which, though bearing some resemblance to it, is an animal of a different species.*

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* Shaw s Travels, vol. i., p. 323.

Blumenbach thus describes these animals :—

Hyrax (Daman.) Dentes pismores superiores, 2; distantes inferiores, 4; contigui palmæ digitis, 4; plantæ digitis, 3; cauda nulla.

Capensis, the daman, Cape hyrax—la marmotte du Cap. H. palmuna unguibus plenis, plantanum unico sabuleto. About the size of the marmot, burrows like it in the ground; but it is difficult to classify, on account of its peculiar anomalous structure, particularly of the teeth and feet.

We come now to the following satisfactory description of the ashkoko, and think there can be little doubt of this curious animal being the coney of the Scriptures. The ashkoko, says Bruce, is found in Ethiopia, *in the caver* *of the rocks*, or *under the great stones in the mountai* *of the sun*, behind the queen's palace at Kosean. is also frequent *in the deep caverns in the rock*, in man other places in Abyssinia. It does not burrow, make holes, as the rat, and rabbit; nature havin interdicted him this practice, by furnishing him wit feet, the toes of which are perfectly round, and of soft, pulpy, tender substance. The fleshy parts of th toes project beyond the nails, which are rather broa than sharp, much similar to a man's nails ill grow and these appear rather given him for the defence his soft toes, than for any active use in digging, t which they are by no means adapted. His hind-fo is long and narrow, divided with two deep wrinkles, clefts, in the middle, drawn across the centre; on eac side of which the flesh rises with considerable protuberancy; and it is terminated by three claws: the middle one is the longest. The fore-foot has four toe three disposed in the same proportion as the hind-foot the fourth, the largest of the whole, is placed lowe down on the side of the foot, so that the top of arrives no farther than the bottom of the toe nex to it. The sole of the foot is divided in the centre b deep clefts, like the other, and this cleft reaches dow to the heel, which it nearly divides. The whole of the fore-foot is very thick, fleshy, and soft, and of a deep black colour; altogether void of hair, though the back, or upper part of it, is thick covered, like the rest of its body, down to where the toes divide; there the hair ends, so that these long, round toes very much resemble the fingers of a man.

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* Zoological Essays, *Christian Magazine*, vol. vii.

In place of holes, it seems to delight in less close, or more airy places, in the mouths of caves, or clefts in the rock, or where one projecting, and being open before, affords a long retreat under it, without fear that this can ever be removed by the strength or operations of man. The ashkoko are gregarious, and frequently several dozens of them sit upon the great stones at the mouth of caves, and warm themselves in the sun, or even come out and enjoy the freshness of the summer evening. They do not stand upright upon their feet, but seem to steal along, as in fear, their belly being close to the ground, advancing a few steps at a time, and then pausing. They have something very *mild, feeble-like*, and *timid* in their deportment; are gentle, and easily tamed, though, when roughly handled at the first, they bite very severely.

This animal is found plentifully on Mount Libanus. I have seen him also among the rocks at the Pharan

Promontorium, or Cape Mahomet, which divi
Elanitic from the Heroopolitic Gulf, or Gulf o
In all places they seem to be the same. If ther
difference, it is in favour of the size and fatnes
those in the mountain of the sun seem to enjo
the others. What is his food I cannot determi
any degree of certainty. When in my posses
ate bread and milk, and seemed rather to be
rate than voracious feeder. I suppose he liv
grain, fruit, and roots. He seemed too tim
backward in his own nature to feed upon livi
or catch it by hunting.

The total length of this animal as he sits, f
point of his nose to the end of his body, is se
inches and a quarter. The length of his sno
the extremity of the nose to the occiput, is thre
and three-eighths. His upper jaw is longer t
under; his nose stretches half an inch beyond
The aperture of the mouth, when he keeps it
profile, is a little more than an inch. The circun
of his snout around both his jaws, is three inc
three-eighths; the circumference of his neck
inches and a half, and its length one inch an
He seems more willing to turn his body alt
than his neck alone. The circumference of h

measured behind his fore-legs, is nine inches and three quarters; and that of his body, where greatest, eleven inches and three-eighths. The length of his fore-leg and toe is three inches and a half; the length of his hind-thigh is three inches and one-eighth; and the length of his hind-leg to the toe, taken together, is two feet two inches. The length of the fore-foot is one inch and three-eighths; the length of the middle toe six lines, and its breadth six lines also; the distance between the point of the nose and the first corner of the eye, is one inch and five-eighths; and the length of his eye, from one angle to the other, four lines; the difference from the fore-angle of his eye to the root of his ear, is one inch three lines, and the opening of his eye two lines and a half. His upper lip is covered with a pencil of strong hairs for moustaches, the length of which is three inches and five-eighths; and those of his eyebrows, two inches and two-eighths. He has no tail, and gives at first sight the idea of a rat, rather than of any other creature. His colour is a grey, mixed with a reddish brown, perfectly like the wild or warren rabbit. His belly is white from the point of the lower jaw to where his tail would begin, if that he had one. All over his body he has scattered hairs, strong, and polished like his moustaches; these are for the most part two inches and a quarter in length. ears are round, not pointed. He makes no noise, certainly chews the cud. To discover this, was principal reason for keeping him alive. Those whom he is acquainted, he follows with great assidu The arrival of any living creature, even of a bird, *m him seek for a hiding-place;* and I shut him up cage with a small chicken, after omitting feeding a whole day. The next morning, the chicken was hurt, though the ashkoko came to me with great of having suffered with hunger. I likewise ma second experiment by inclosing two smaller with him, for the space of several weeks; nei were these hurt, though both of them fed, wit impediment, of the meat that was thrown into cage, and the smallest of these, a kind of titm seemed to be advancing in a sort of famili with him, though I never saw it venture to perch him; yet it would eat frequently, and at the same of the food upon which the ashkoko was feeding; in this consisted chiefly the familiarity I speak o the ashkoko himself never shewed any alteratio behaviour upon the presence of the bird, but treat with a kind of absolute indifference. The cage, in was large, and the birds having a perch to sit upon, in the upper part of it, they did not annoy one another.

In Amhara this animal is called *ashkoko,* which I apprehend is derived from the singularity of those long terinaceous hairs, which, like small thorns, grow about his back, and which in Amhara are called *ashkok.* In Arabia and Syria he is called Israel's Sheep, or *gannim Israel,* for what reason I know not, unless it is chiefly from his frequenting the rocks of Horeb and Sinai, where the children of Israel made their forty years' peregrination. Perhaps this name obtains only among the Arabians. I apprehend he is known by that of *shaphan* in the Hebrew, and is the animal erroneously called *cuniculus,* the rabbit or coney.

Many are the reasons against admitting this animal, mentioned by Scripture, to be the rabbit. We know that this last was an animal peculiar to Syria, and therefore could not be supposed to be either in Judea or Arabia. They are gregarious indeed, and so far resemble each other, as also in point of size; but in place of seeking homes in the rocks, we know the *cuniculus'* desire is constantly sand. They have claws, indeed, or nails, with which they dig holes or burrows, but there is nothing remarkable in them, or their frequenting rocks, so as to be described by that circumstance; neither is there anything in the character of the rabbit that denotes excellent wisdom, or that they supply the want of strength by any remarkable sagacity. The *shaphan*, then, is not the rabbit, which last, unless it was brought to him by his ships from Europe, Solomon never saw. It was not the rabbit's particular character to haunt the rocks. He was by no means distinguished for feebleness, or being any way unprovided with means of digging for himself holes. On the contrary, he was armed with claws, and it was his character to dig such, not in the rocks, but in the sand. Nor was he any way distinguished for wisdom, more than the hare, the hedge-hog, or any of his neighbours.

Let us now apply these characters to the *ashkoko*. He is above all the animals so much attached to the rock, that I never once saw him on the ground, or from among large stones in the mouth of caves, where is his constant residence. He is gregarious, and lives in families; he is in Judea, Palestine, and Arabia, and consequently, must have been familiar to Solomon. For David describes him very particularly, and joins him with other animals perfectly known to all men. (Psalm civ. 18.) "The hills are a refuge for the wild goats; and the rocks for the shaphan, or ashkoko;" and in Proverbs xxx. 24, "The sapharvim are a feeble folk, yet make they their houses in the rocks." Now this, I think, very obviously fixes the ashkoko to be the shaphan, for this weakness seems to allude to his feet, and how inadequate these are to dig holes in the rock, where yet, however, he lodges. These are, as described above, perfectly round, very pulpy or fleshy, so liable to be excoriated or hurt, and of a soft fleshy substance. Notwithstanding which, they build houses in the very hardest rocks, more inaccessible than those of the rabbit, and in which they abide in greater safety, not by exertion of strength, for they have it not, but are truly, as is said, "a feeble folk;" but by their own sagacity and judgment; and are, therefore, justly described as wise.

Lastly, what leaves the matter without doubt is, that some of the Arabs, particularly Damir, say, that the shaphan has no tail; that it is less than a cat, and lives in houses, that is, not houses with men, as there are few of them in the country where the shaphan is; but that he builds houses and nests of straw, in contradistinction to the rabbit, and rat, and those other animals that burrow in the ground, who cannot be said to build houses, as is expressly said of him.

The Christians in Abyssinia do not eat the flesh of this animal, as holding it unclean; neither do the Mahometans, who in many respects of this kind, in abstinence from wild meat, have the same scruples as Christians. The Arabs in Arabia Petrea do eat it, and I am informed those on Mount Libanus also. Those of this kind that I saw were very fat, and their flesh as white as that of a chicken. Though I killed them frequently with the gun, yet I never happened to be alone, so as to be able to eat them. They are quite devoid of all smell and rankness, which cannot be said of the rabbit. I have no doubt that the *el akbar* and the *el webro* of the Arabs, are both the same animal. The *el akbar* only means the largest of the *mus mortenus*, under which they have classed the *jerboa*. The *jeed* and *el webro*, as also the ashkoko and akbar, answer to the character of having no tail.

"The animal," says Bancroft, in his Natural History of Guiana, "called by the white inhabitants of Guiana, an 'Indian coney,' and by the natives, 'pacearaca,' seems to be of an intermediate species, between the hare and rabbit. In size, the colour of their hair, and shape, they pretty much resemble the hare; but in the taste of their flesh, and in burrowing in the earth, they resemble the rabbit. Their legs are about four inches in length. Their ears are somewhat small, and roundish; the belly is white; and the head pretty resembles that of a hare; they have cloven lips, tails. They are very prolific, and their flesh es near one-half of the animal food of the na- ıs· they are the most numerous, and easily of any other animal whose flesh is equally le."

e are probably the same species of animals de- by Wufer on the Isthmus of Darien.

aveller through Albany says, "a few hundred ıp the Fish River we were locked in on either r overhanging rocks, and trees of the richest . One boat disturbed many of the dos or coney n along the rocks. This little creature is of a olour, like a rat, and seems to be of a species n the rabbit and the guinea-pig; it is esteemed ating, and the flesh is white; but from its paws ling those of a cat, it is not inviting."

African coney, called at the Cape, dag, *hyrax us*, is about the size of a rabbit; but, in figure, e nearly resembles a guinea-pig: it possesses, in arkable degree, the power of ascending rocks, st which it has its dwelling. "They are found," arrow, "in the caverns of the Table Mountain; ideed, in almost every mountain of the colony. f a dusky colour, with short ears, and no tail.

Pennant calls it Cape cavy. The flesh is used for the table, but is black, dry, and of an indifferent flavour."

These little animals abound also in Jamaica. Mr. Cope says, describing a *living* specimen before him, "It is of a dark brown colour, very familiar, and almost affectionate, gratified by kind notice, and utterly devoid of fear." Mr. Hill says, writing from a forest in the same island, "Here is a perfect warren of Indian conies . . . . . . I learn that our coney is fond of browsing the logwood, and the bastard cedar. It is never seen out in wet weather; and it has never yet been traced by its foot-prints. This species appears to be the 'small Indian coney,' *major, fusco cincreus caudâ truncatâ*, of Browne, of which he gives no distinct information, except that it is a native of Jamaica. Sloane takes not the least notice of it. Long merely includes it in his enumeration of the wild animals.

From the habits of this animal we may learn much: first, from his place of refuge. Oh! may the Rock of Ages be ever ours! Next, from its brotherly kindness: "Let *us* dwell at peace with all men, shewing kindly affection to our brethren: and forbearing one another in love." "In such holy confidence and loving trust, is true wisdom." "When thus weak, then are we strong." Hence the proverb, "Fortiter in re, suaviter in modo."

The Locusts have no king, yet go they forth all of them by bands.

Prov. xxx. 27

THE LOCUST.

ɔugh so small an animal, the locust is described
of the most terrible scourges with which the
l Majesty of heaven chastises a guilty world."
er than ten different names are given to this
in the sacred volume, every one of which,
e manner of Hebrew nouns, marks some dis-
character or peculiar effect. It is called *arbe,*
extraordinary fecundity, in which it is surpassed
reature. The sacred writers, in speaking of their
's, use the most general terms which language
nish. Ezekiel xxxiii. 4: "For they came up
eir cattle and their tents, and they came as
ppers (or locusts) for multitude; for both they
eir camels were without number." Daniel xi.
nd the Midianites, and the Amalekites, and all
n of the east, lay along in the valley like grass-
(or locusts) for multitude." The Psalmist
ns their immense numbers in the same terms,

Psalm cv. 34: "He spake, and the locusts cam
caterpillars, and that without number." In Jer
xlvi. 23, the enemies of Egypt are thus desc
"They shall cut down her forest, saith the Lord, t
it cannot be searched; because they are more th
grasshoppers (locusts), and are innumerable."
hum iii. 15: "Make thyself many as the cankerw
said the prophet Nahum to the people of Ni
"Make thyself many as the locusts." The ac
of these statements is attested by numerous and
ceptionable witnesses. In some regions of th
the whole earth is at times covered with locu
several leagues, often to the depth of four, som
of six or seven inches. Their approach, which ca
noise like the rushing of a torrent, darkens the
zon; and so enormous is their multitude, it hid
light of the sun, and casts an awful gloom like
an eclipse over the field. Major Moore, when a
nah, had the opportunity of seeing an immense
of these animals which ravaged the Mahratta co
and was supposed to have come from Arabia.
column they composed," says he, "extended fiv
dred miles; and so compact was it when on the
that, like an eclipse, it completely hid the sun, s
no shadow was cast by any object," and some

tombs, distant from his residence two hundred yards, were rendered quite invisible. The noise they make in browsing on the trees and herbage may be heard at a great distance, and resembles the rattling of hail, or the noise of an army foraging in secret. The inhabitants of Syria have observed that locusts have always bred by too mild winters, and that they constantly come *from the deserts of Arabia*. When they breed, which is in the month of October, they make a hole in the ground with their tails, and, having laid about 300 eggs in it, and covered them with their feet, expire; for they never live above six months and a half. Neither rains nor frost, however long and severe, can destroy their eggs; they continue till spring, and, hatched by the heat of the sun, the young locusts issue from the earth about the middle of April.

From the circumstance of their young ones issuing from the ground, they are called *gob*, or *gobar*, from an Arabic verb, which signifies to rise out of the earth.

The third name is *gassam*, from the root *gassag*, to cut off, or to spoil; and more destructive and insatiable spoilers were never let loose to desolate the earth. Pliny calls them a scourge in the hand of an incensed deity. Wherever their innumerable bands direct their march, the verdure of the country, though it resembled before the Paradise of God, almost instantaneously disappears. The trees and plants, stripped of their leaves, and reduced to their naked boughs and stems, cause the dreary image of winter to succeed in an instant to the rich scenery of spring; and the whole country puts on the appearance of being burnt. Fire itself devours not so fast; nor is a vestige of vegetation to be found when they again take their flight to produce similar disasters. In a few hours they eat up every green thing, and consign the miserable inhabitants of the desolated regions to inevitable famine. Many years sometimes are not sufficient to repair the desolation which these destructive insects produce. When they first appear on the frontiers of the cultivated lands, the husbandmen, if sufficiently numerous, endeavour to divert the storm by their gestures and their cries, or strive to repulse them by raising large clouds of smoke; but frequently their herbs and wet straw fail them; they then dig a variety of pits and trenches all over their fields and gardens, which they fill with water, or with heath, stubble, and other combustible matter, which they set on fire upon the approach of the enemy. These methods of stopping their march are of great antiquity, for Homer familiarly refers to them as practised in his time. But they are all to no purpose, for the trenches are quickly filled, and the fires extinguished, by infinite swarms succeeding one another, and forming a bed on their fields of six or seven inches in thickness. But the two most powerful destroyers of these insects are the south, or south-easterly winds, and the bird called the "samarmar." These birds, which greatly resemble the woodpecker, follow them in large flocks, greedily devour them, and, besides, kill as many as they can; they are, therefore, much respected by the peasants, and no person is ever allowed to destroy them. The southerly winds waft them over from the lands beyond the Mediterranean, in whose waters they perish in such great quantities, that when their carcases are cast on the shore, they infect the air for several days to a considerable distance. The traveller, who crushes them beneath the wheels of his waggon, or the feet of his horses, is reduced to the necessity of washing his nose with vinegar, and holding his handkerchief, dipped in it, continually to his nostrils. The earliest plague of this kind, and the most direful in its immediate effects, was that with which the Egyptian tyrant and his people were visited for their oppression of the Israelites. One of the most grievous calamities ever inflicted by the locust, happened to the regions of Africa in the time of the Romans, and fell with peculiar weight on those parts which were subject to their empire. Scarcely recovered from the miseries of the last Punic war, Africa was doomed to suffer, about one hundred and twenty-three years before the birth of Christ, another desolation, as terrible as it was unprecedented. An immense number of locusts covered the whole country, consumed every plant and every blade of grass in the field, without sparing the roots, and the leaves of the trees, with the tendrils upon which they grew. These being exhausted, they penetrated with their teeth the bark, however bitter, and even corroded the dry and solid timber. After they had accomplished this terrible destruction, a sudden blast of wind dispersed them into different portions, and after tossing them a while in the air, plunged their innumerable hosts into the sea. But the deadly scourge was not then at an end, the raging billows threw up upon that long-extended coast, enormous heaps of their dead and corrupted bodies, which produced a most insupportable and poisonous stench. This soon brought on a pestilence, which affected every species of animals; so that birds, and sheep, and cattle, and even the wild beasts of the field, perished in great numbers; and their carcases, being soon rendered putrid by the foulness of the air, added greatly to the general corruption. The destruction of the human species was horrible; in Numidia, where at that time Micipsa was king, eighty thousand persons died; and in that part of the sea-coast which bordered upon the region of Carthage and Utica, two hundred thousand are said to have been carried off by this pestilence.

From Africa this plague was occasionally imported into Italy and Spain; and a historian, quoted in Mouffet, relates that in the year 591 an infinite army of locusts, of a size unusually large, grievously ravaged part of Italy, and being at last cast into the sea, which threw them back on the land, there arose a pestilence which carried off near a million of men and beasts. In the Venetian territory, also, in 1478, more than thirty thousand persons are said to have perished in a famine occasioned by these terrific scourges.

At a later period, in Languedoc, when the sun became hot, they took wing and fell upon the corn, devouring both leaf and ear, and that with such expedition, that in three hours they would consume a whole field. After having eaten up the corn they attacked the vines, the pulse, the willows, and lastly the hemp, notwithstanding its bitterness.

From 1778 to 1780, the empire of Morocco was terribly devastated by them. Every green thing was eaten up, not even the bitter bark of the orange and pomegranate escaping. A most dreadful famine ensued. The poor were seen wandering over the country deriving a miserable subsistence from the roots of plants; and women and children followed the camels, from whose dung they plucked the undigested grains of barley, which they devoured with avidity; in consequence of this, vast numbers perished; and the roads and streets exhibited the unburied carcases of the dead.*

From Mogador to Tangier, before the plague in 1799, the face of the earth was covered by them. At that time a singular incident occurred at El Araiche. The whole region, from the confines of Sahara, was ravaged by them; but on the other side of the river Elkos, not one of them was to be seen, though there was nothing to prevent their flying over it. Till then they had proceeded northward; but upon arriving at its banks, they turned to the east, so that all the country north of El Araiche was full of pulse, fruits, and grain; exhibiting a most striking contrast to the desolation of the adjoining district. At length they were all carried by a violent hurricane into the western ocean; the shore, as in former instances, was covered by their carcases, and a pestilence ensued; but when this evil ceased, their devastations were followed by a most abundant crop. The Arabs of the desert, "whose hands are against every man," and who rejoice in the evils that befall other nations, when they behold the clouds of locusts proceeding from the north, are filled with gladness, anticipating a general mortality, which they call *el khere* (the benediction); for, when a country is thus laid waste, they emerge from their arid deserts, and pitch their tents in the desolated plains.

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* The inhabitants of Morocco have a method of preserving grain which must prove some resource against the famine occasioned by the voracity of the locusts. This is, the burying their store in subterraneous apartments, in which it will keep good for twenty or thirty years. Among the wealthy Arabs, a father usually fills a *mitfere*, or pit, on the birth of a child, and empties it on the day of his marriage. Soon after the pit is opened, the corn contracts a bad taste; a man, therefore, on opening his granary, lends corn to all his neighbours, and receives it back as they respectively open theirs.

Thus, dear children, is it, alas! ever the tendency of evil to perpetuate itself. He who is evil by nature, (and alas! such we are *all* by nature, hateful, and "hating one another,") "will rejoice in iniquity," and, like the Arab, follow in the track of the locust, who, as Jeroboam did, "made Israel to sin." What a fearful power to do evil has combined littleness!

How beautifully is the accuracy of the Scripture statement proved, "The locusts have no king, yet go they forth by bands," by the following facts!

"The armies of locusts, though they herd together, travel together, and feed together, consist of an infinity of separate families, all derived from different mothers, who have laid their eggs in separate cells or houses in the earth; so that there is little or no analogy between the societies of locusts, and those of bees and ants; and it follows that, as they have no common mother, like the bees, to lead their swarms, there is no one that nature, by a different organization and ampler dimensions, and a more august form, has destined to this high office."

There is another peculiarity in them worthy of remark, that though so exceedingly voracious, and though the plains on which they may have happened to alight may not be sufficient to supply the whole of their countless myriads, yet there is a semblance of subordination among them. They are not observed to scramble for the portion which a more fortunate neighbour may have alighted on, but each takes that which falls to his lot. And in one account of their terrible devastations in Hungary, the author says, "Their course is orderly, as they all appear to go to one spot."

A very interesting account of the ravages these creatures made in Estremadura in the years 1754-5-6, and 7, is given by Baron Dillon in his Travels through

Spain, where he tells us that locusts are continually seen in the southern parts of Spain, particularly in the remote districts of Estremadura; but, in general, are not taken notice of, as there they commonly feed on wild herbs, and their yearly number is inconsiderable; but, in these years, their increase was so great, from the multitude of females, that all La Mancha and Portugal were covered by them. Owing to the delicacy of their olfactory organs, they know how to avoid alighting on a cultivated field for the purpose of depositing their eggs, but repair for that purpose to some barren and lonesome situation, where their progeny may be reared in safety. Its motions are the consequences of primitive laws, founded on Infinite wisdom, and not proceeding from secondary reflection; therefore, its behaviour preserves a constant sameness and uniformity, originally perfect, and not standing in need of alteration. She knows that so soon as her offspring are born she must die, and regulates her conduct in consequence. The time of hatching varies according to climate. Legions of them were skipping about at Almeira in February, because the climate there is so mild, that most kind of greens are nearly over at that time. In Sierra Nevada, they only begin to appear in April, and in La Mancha they were hardly animated in May, when there were no greens yet in the market of San Clemente, so that they form a certain thermometer to judge of the warmth of the air. From these various situations proceed those immense swarms which appear successively in June, July, and August; but, as they lay their eggs in barren places, which require a certain additional warmth to hatch them, it will account for their not appearing so frequently in cold climates, except such casual swarms of them as may have been wafted there by the winds. When they first come out of the egg they are black, of the size of a gnat, and gather in great heaps at the foot of shrubs. At this period they live only upon dew, and are foraging about to catch it. In a few days they move at a very little distance, their limbs being weak, their wings very small, and their teeth not sufficiently strong to bite the grass. In about twenty days, they begin to feed on the youngest shoots of plants, and as they arrive at their full growth, they throw off their larva state by casting their skins. To prepare themselves for this change, they fix their hinder parts to some bush or twig, or corner of a stone; when immediately, by an undulating motion, their heads will first appear, and soon after the rest of their bodies. The whole transformation is performed in seven or eight minutes' time, after which they remain for a little le in a weak state; but as soon as the skin and air len their wings, and dry up the moisture that ains after casting their sloughs, they leave the ety of each other, and range farther off, con- ing day and night everything they fix upon, till r wings have acquired a full degree of strength. the mean time, they seem to devour—not so much a a ravenous appetite, as from a rage of destroying ything that comes in their way. It is not surprising they should be fond of the most juicy plants and ts, such as melons, and all manner of garden fruits herbs, feeding also upon aromatic plants, such as thorn-apple and deadly nightshade. They will even upon crowfoot, whose causticity burns the very of beasts; and such is their universal taste, that do not prefer the innocent mallow to the bit- furze, or rue to wormwood, consuming all alike, out predilection or favour, with this remarkable umstance that, during the four years they com- ed such havoc in Estremadura, the *love apple*, or *pernicon solanum* of Linnæus, was the only plant escaped their rapacious tooth, and claimed a re- t to its root, leaves, flowers, and fruit. Naturalists search for their motives, which Baron Dillon de- es himself at a loss to discover, but adds, "I saw millions of them light on a field near Almadan, and devour the woollen and linen garments of the peasants, which were lying to dry on the ground. The curate of the village, a man of veracity, assured me that a tremendous body of them entered the church, and devoured the silk garments that adorned the images of saints, not sparing even the varnish on the altars. The better to discover the nature of such a phenomenon, I examined the stomach of the locust, but only found one thin and soft membrane, with which, and the liquor it contains, it destroys and dissolves all kind of substances, equally with the most caustic and venomous plants, extracting from them a sufficient and salutary nourishment.

Its head is the size of a pea, though longer, its forehead pointing downwards, like a handsome Andalusian horse; its mouth large and open, its eyes black and rolling, added to a timid aspect not unlike a hare. With such a dastard countenance, who would imagine this creature to be the scourge of mankind? In its two jaws it has four incisive teeth, whose sharp points traverse each other like scissors, their mechanism being such as to gripe or to cut. Thus armed, what can resist a legion of such enemies; after devouring the vegetable kingdom, were they, in proportion to their strength and numbers, to become carnivorous, like wasps, they would be able to destroy whole flocks of sheep, even the dogs and shepherds, just as we are told of ants in America, that will overcome the fiercest serpents; but the Almighty has mercifully set them their bounds that they cannot pass. The first direction of their formidable columns, when they rise together five hundred feet high, forming a black cloud that darkens the rays of the sun, is always against the wind, which, if not too strong, it will extend about a couple of leagues. They then make a halt, when the most dreadful havoc begins. The males climb up the plants as sailors do the shrouds of a ship; they nip off the tenderest buds, which fall to the females below. At last, after repeated devastations, they light upon some barren ground, and the females prepare for laying their eggs. What a dismal sight for a poor farmer, after having been visited by such cruel guests! We learn by tradition, as well as from history, that these locusts have been a plague to the meridional provinces of Spain from time immemorial. In an old Spanish novel, the following question is put: "Which is the animal that most resembles all other animals?" The answer is: "The locust; because he has the horns of a stag, the eyes of a cow, the forehead of a horse, the legs of a crane, the neck of a snake, and the wings of a Many old people stated, when so much misch done by them in 1754, that it was the third their recollection, and that they are always fc the pasture grounds of Estremadura, whence they into the other provinces of Spain. They are c indigenous, being of a different shape from t the north or the Levant, though their habits a be so alike. The locust of Spain is the only c has rose-coloured wings; besides, it is impossil can come from any other part; from the nor clear they do not, by the observation of so mar from the south they cannot, without crossing t which is hardly possible, by the shortness c flight, and like birds of passage, they would be Baron Dillon once saw a cloud of them pass o laga, and move towards the sea, and go ove about a quarter of a league, to the great joy of habitants, who concluded they would soon be d but, to their disappointment, they suddenly about towards the coast, and pitched upon an vated space, surrounded with vineyards, which t after quitted. When once they appear, let the demolished be ever so great, the proportion re is still too considerable; therefore, the only wa an end to such a calamity is to attack them beforehand, and destroy their eggs, by which means they might be totally extirpated.

These statements will show that the locust is one of the most terrible instruments in the hand of incensed Heaven; it will discover the reason that the inspired writers, in denouncing the judgments of the Almighty, so frequently allude to this insect, and threaten the sinner with its vengeance; it accounts in the most satisfactory manner for the figures which the prophets borrow when they describe the march of cruel and destructive armies from the character and habits of this creature. The narratives of Volney, Thevenot, and other travellers, who have seen and described the innumerable swarms of the locusts, and their wasteful ravages, fully confirm the glowing description of Joel and other inspired writers. (Joel i. 6, 7, 10, 11, 12, and ii. 2, 3, 9, 10.) The same allusion is involved in those words of Nahum, concerning the fall of the Assyrian empire. (Nahum iii. 17.) Bochart and other writers, who are best acquainted with the eastern countries, mention a great variety of locusts, which vindicates the language of the prophet: "Thy captains are as the great grasshopper."

"The locusts have no king, yet they go forth by bands." How just is this remark! The head of the

column, when the army is not tossed and scatt
the winds, which often happens, is directed
voracious desire of food; and the rest follow
succession, under the influence of the same i
but the devastations they commit are as me
and complete as if they acted under the
discipline.

Travellers obtain a lively idea of the Psalmis
parison, "I am driven up and down like the
In prosecuting their work of destruction, th
their ranks like soldiers in order of battle, clin
they advance, over every tree or wall that st
their way: they enter into the very houses a
chambers, like so many thieves. It is impos
stop their motions, or even to alter their line of
while the front is regardless of danger, and
presses on so close, that a retreat is altogether
ble. A day or two after one of these hordes i
tion, others are already hatched to march an
after them, gnawing off the very bark, and th
branches of such trees as had before escaped,
loss only of their fruit and foliage. So just
they been compared by the prophet to a great

It is supposed by Dr. Shaw, that the locust was
some beast, or the pernicious destructive anima

original words may be interpreted, which with the sword, the famine, and the pestilence, made the four sore judgments with which the prophet Ezekiel threatened Jerusalem. The Jews were allowed to eat them. John the Baptist, in feeding on that insect, submitted to no unusual privation, and practised no savage rigour, but merely followed the abstemious mode of living to which the people were accustomed, in the less frequented parts of the country.

The *gryllus migratorius*, or wandering locust, has head inflected, armed with jaws, of a blackish or blueish colour, and furnished with palpi, or feelers, antennæ either setaceous or filiform; four wings, deflected, convolute, the inferior ones plaited; hind-feet formed for leaping; claws on all the feet double. It is generally of a brownish colour, varied with spots of a deeper cast, and in some parts with a pale red, or flesh colour; and the legs are commonly blueish.

The wings of some being spotted, were thought by the Mahomedans to be leaves from the book of fate, in which letters, announcing the destiny of nations, were to be read. Paul Zetzote, professor of Greek literature at the Gymnasium of Stettin, wrote a work on the meaning of the three letters which were, according to him, to be seen on the wings of those locusts which visited Siberia, in 1732. These letters were B. E. and formed the initials of the Latin words, "Be Erunt Sæva," or, "Babel Est Solitudo;" also German words, "Bedentet und Eschreckliche Schl ten," portending frightful battles; "Bedentet u Erfreuliche Siege," portending happy victories. content with the dreadful presence of this plague, inhabitants of most countries took that opportunity adding to their present misery, by prognosticat future evils. The direction of their flight pointed the kingdom doomed to bow under the Divine wra The colour of the insect designated the national u form of such armies as were to go forth and conqu Aldovrandus states, on the authority of Cruntz, t Tamerlane's army being infested by locusts, that c looked on it as a warning from God, and desisted fr his designs on Jerusalem.

The locust is employed in the book of Revelation symbolize the countless and savage hordes that fou under the banners of the Saracen princes: "And t had no king over them." This remarkable comparis is almost in every particular quite familiar to Arabs. Niebuhr, in his description of Arabia, infor us, that an Arab of the desert, near Bussorah, m tioned to him a singular comparison of the locust w other animals. He regarded it as a jest of the Bedouin, and paid no attention to it, till it was repeated by another from Bagdad. He compared the head of the locust to that of the horse; its breast to that of the lion; its body to that of the serpent; its tail to that of the scorpion; its horns to the locks of hair of a virgin, and so of other parts. It has been remarked by almost every one who has paid attention to this branch of natural history, that the head of a locust bears a striking resemblance to that of a horse. The Greeks called it the horse of the earth. Accoutred for war, and mounted by a stern and bearded warrior, the Arabian charger has a majestic appearance. Not less dreadful to the inhabitants of the east, is the locust, in all the vigour of youth, ready to commence his destructive march. The Saracen furnished his horse with a silver bridle, and gilt trappings, and covered his neck and breast with plates of iron; it is therefore not improbable, that he adorned his head with some ornament resembling a crown, to which the horns or antennæ of the locust may not improperly be compared. The neck of this formidable insect is also defended by a hard, scaly substance, in the same manner as the neck of the Arabian war horse was defended by plates of iron. The Arabian horse is carefully taught to recognise his enemy in the field of battle, which he no sooner does, than he rushes upon him with the utmost violence, and attempts to tear him in pieces with his teeth. The teeth of the locust are very sharp and strong. With what astonishing rapidity this insect devours every green thing, and scatters desolation over the fairest regions of the earth, have already been described; from whence it appears, that the comparison of the Saracen horse to the locust, is by no means inapplicable. Nor is the sound of their wings less remarkable. The inspired writer says, "The sound of their wings was as the sound of chariots of many horses, running to battle." And travellers have stated, that "the passage over their heads was like the noise of a cataract, or the rushing of a violent gale of wind, at a distance."*

In the sacred writings, the locust is everywhere the symbol of hostile armies; for these insects always appear in large companies or troops, and, from their destructive qualities, are considered as enemies. Jer. xlvi. 23; Nahum iii. 15; Deut. xxviii. 38-42; Psalm lxxviii. 46; Amos vii. 1. God made use of them as a hostile army, to execute His judgments: hence the first great plague on Egypt arose from their visitation,

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* Morier's Travels.

Exod. x. There they are represented as coming from the east, *i. e.*, from Arabia, the neighbouring country. And in Judges vi. 3, 6, and vii. 12, the children of the east, meaning the Arabians, are compared to locusts for multitude, and as committing the same damage. See also, Kings iv. 30.

The eastern interpreters of dreams explain the appearance of locusts in a similar manner:—"If any king or potentate shall dream of locusts coming to any country, in that place he may expect a multitude of powerful enemies." See also Josephus, de Bello Jud. c. 7. The natural locust has a very hard skin, in appearance like scales, or armour. Hence Joel says, ii. 8, "When they fall upon the sword they shall not be wounded;" and the Apocalyptic locusts are described as "having breastplates, like breastplates of iron."

As these symbolical locusts hurt men (Rev. ix. 4), which the natural locusts do not, farther than by injuring vegetation, we are at once led to infer that they are to be understood of a class of persons, who resemble that insect only in some of its more remarkable qualities, such as number, noxiousness, and capacity of devastation, especially when they are portrayed as having "human faces," and "hair like women," "golden coronets," or "turbans," and the like; all whic can only be affirmed of those whom the locust syn bolises. The time of their continuance is said to b five months, the usual time of the appearance of thes insects, which is only in four or five months of th year. They begin to appear in spring, about a mont after the equinox, and are only seen at most durin part of April, May, June, July, and August, and pa of September. These insects were accounted the mo dreadful plague, insomuch that those who were instru mental in delivering any nation from them, were repai with divine honours. Thus the Reteans named He cules Cornopion, from *cornops*, a locust, and worshippe him under that character, because he drove away th locusts from them.

The annals of most hot countries are filled with a counts of the devastations produced by the locust They seldom now visit Europe in such swarms as fo merly; yet in the warmer parts they are still formid ble. Those that have at uncertain intervals visite Europe, within the memory of man, are supposed t have come from Africa. Some of them have at di ferent times been seen in Britain, and great mischie have been apprehended; but, happily for us, the col ness of our climate, and the humidity of our soil, a very unfavourable to their production; they, therefore, all perish, without leaving a young generation to succeed them.

In the tropical climates their presence is not attended with such destructive consequences as in the southern parts of Europe; for in these the vegetative power is so strong and active, that an interval of only a few days will sometimes repair all the damage. "One thing, which always surprised me," says Mr. Adamson, in his Voyage to Senegal, "is the amazing rapidity with which the sap of trees in this country repairs any loss they may happen to sustain; and I was never more astonished than when, four days after a terrible invasion by the locusts, in which every green thing was devoured, I saw the trees covered with new leaves, and not appearing to have suffered greatly. The herbaceous plants bore marks of the devastation somewhat longer; but a few days were sufficient to repair every mischief." But in Europe their ravages cannot be obliterated till the succeeding year. In their long flights to this part of the world, from the extent of their journey, they are also nearly famished, and, therefore, more voracious wherever they happen to alight. We are told that nearly as much damage is occasioned by what they touch as by what they devour. Their bite is thought to contaminate the plants, and either to destroy or greatly to weaken their vegetation. To use the expression of the husbandmen, "They burn wherever they touch, and in some countries leave the mark of their devastation for three or four years afterwards."

The reason why the approach of the swarms of the locusts is compared with the morning[*] spread upon the mountains, is pointed out in the following passage of Francis Alvarez, a Portuguese monk, in his travels through Abyssinia. "The day before the arrival of the locusts, we could presume they were coming, from a yellow reflection in the air, which proceeded from their yellow wings. As soon as this reflection appeared, nobody doubted that an immense swarm of locusts was approaching." On another occasion the same writer observes, that he saw this phenomenon so strong, that the ground assumed a yellow tinge from the reflection. The day after there came a swarm of locusts, which, according to what we heard afterwards, covered the country for an extent of four-and-twenty Portuguese miles. It was observed of them that "they appeared to be assembled with all the precision of military tactics."

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[*] Joel ii. 2.

An anonymous traveller through Albany and Caffreland, in relating his progress near the Fish River, says, "Soon after leaving behind us the unpleasant sounds of screams from some dozens of baboons, we were in a shower, as we thought, of flying ants; but from the blows we received on our face and hands, and the horses turning round, we discovered them to be locusts,—the scourge with which this country is occasionally visited. They differ from those in a lower latitude; the colour of the body is a dusky grey, and the wings white and transparent. These pests had settled on a green grassy spot in our path, and would soon devour every blade."

Captain Adams tells us, that on the coast of Angola, locusts are sometimes seen in immense numbers. Soon after an earthquake, or seaquake, that occurred at Cabenda, and which extended to some distance to the southward and northward of that port, a flight of locusts took place, that continued three days and three nights, so that the sea was literally covered with their drowned carcases; and the ship's deck, masts, yards, and rigging, swarmed with them to such excess, as to require the constant attention of the crews to sweep them overboard. The earthquake, which had preceded their flight only a few hours, drove in upon the shore from the westward several tremendous seas, so as to cause some of t vessels, when in the trough of them, to strike t ground in five-and-a-half fathoms water. Many of t natives, both here (Cabenda) and at Malemba, we drowned upon the beach, in consequence of its bei so very narrow, and the cliffs which bound it so e tremely precipitous, that they could not escape the ove whelming waves which came suddenly upon them. this calamity was added, the destruction of ma canoes by this sudden inundation of the sea; and t locusts destroyed every blade of grass, and all t vegetable productions of the soil, for many mil round."

Nozram says, in his Travels in Egypt and Syria, "Next day's march reaches Beer-el-Bar, a distance about twenty miles, gradually descending through more open valley, and emerging from the wild, roc scenery, lately traversed. We observed a number locusts during the journey, but not in the destructi sun-obscuring clouds which render them the fearf scourge so often alluded to in the Old Testamen They appear to be natives of the desert, and are on brought into Egypt by an east wind, where they som times destroy, in a few days, every green blade in t track they traverse, skimming along the surface of t ground from perch to perch, and devouring, indiscriminately, every herb they light upon. The odious thing resembles a large, spotted red-and-black double-winged grasshopper, about three inches or less in length, with the two hind legs, working like hinged springs, of immense strength and elasticity. As the east wind brings them, so the west wind carries them away; and man, with all his contrivance, can do nothing to defend himself against the overwhelming invasion; for if every inhabitant were to destroy a bushel, the diminution would never be felt or noticed. It seems singular that these horrible *grylli* should be born and bred in the barren wastes of Africa and Arabia, where they find so little of the green food for which they show such a ravenous craving in richer regions. But, both cold and damp appear equally unfavourable to their propagation, —one fact among many which may reconcile us to our own climate, as one week's portentous visit might destroy the harvest of a year. And they are even more fatal to man in death than in life, from the corruption of their myriads."

Nothing short of a scientific description could convey more accurately the nature of the locust, after his kind, than that given in Leviticus xi. 27. Our version renders "arbeth," locust, and "solgam," bald locust; but the distinction is probably not understood. Those saw had dark brown heads, the size of small peas, wit bright black projecting eyes, a pair of fine horns o feelers, and an upper and under pair of wings, dar brown, and light transparent green respectively.

Major Griffith, in his Travels in Italy, speaks c them at Civita Vecchia. "He was," he says, "surprised to find the place infested with locusts: ever step he took ten or twelve of them flew up—some wer of a smaller kind than those we have generally seen and had scarlet, blue, orange, and yellow wings, tippe with black."

However rare the event, it is certainly true, that th common or devastating locust (*gryllus migratorius*) ha been known to visit the British Islands, and the circumstance is more deserving of notice, since its recurrence may enable us to form some opinion of th particular influences which brought them thither Ruyset says, in his *Theatrum Animalium*, that, i the year 874, after devastating France, they attempte to cross the British Channel; and such multitude were drowned and thrown on shore, that their putrefaction was said to have caused a pestilence, whic soon after followed. But the Channel has not alway proved an impassable barrier, for it is recorded that, i the year 1693, clouds of locusts were seen in Wales, as the following account will show :—

We read in the Philosophical Transactions for 1700, this letter from Mr. Edward Floyd: "I am informed that great swarms of locusts have lately appeared in Wales. They were first seen about the 20th October, 1693, scattered about the fields in Marthery Parish, Pembrokeshire, where they were generally taken notice of at first, because of the unseasonableness of the time for grasshoppers; but afterwards, for upon further examination, they found them distinct from our English grasshoppers, in bigness, colour, &c. I could not learn that any of them have been seen flying in that country. But from North Wales I am informed, that two vast swarms of them had been seen in the air not far from Dolgellay, a market town of Merionethshire; and I guess, by the date of my friend's letter, that it was near the same time that those others of Pembrokeshire had been taken notice of in the fields. They are of the same species with some African locusts in the Museum Ashmol., for which we are obliged to Mr. J. Aubrey, who received them some years since from Tangier. This pilgrim locust I call "*locusta erratica, alis ichthyocollis, adiustar pellucida, reticulatis maculis conspersis.*" It is in length (from the head to the tips of the wings) three inches and a half, of a reddish colour all over, except the wings. The eyes are prominent and very large, somewhat of the form and bigness of groundsel seeds, of a reddish colour, elegantly streaked. The antennæ are about the bigness of a hog's bristle, and curiously geniculated. The first pair of legs are not quite an inch long; the second somewhat above the length; but the third, two inches and a quarter. Their hind legs are very beautiful; for the thighs are hexangular, and elegantly sealed on the outside with a black line extended lengthways through the midst of them. The shanks are of a lively red colour, adorned on the hinder part with two orders of small short prickles, placed not opposite to each other, but alternately. The wings are about three inches long, resembling very much those of the larger libellæ or dragon-flies, but all over garnished (the outer wings at least) with reticulated black spots. I see not much reason to doubt but that these are the very same species of locusts, so famous in history for their wandering over, and depopulating whole regions.

Among Donovan's beautiful representations of British insects, is included a figured specimen of the *gryllus migratorius,* because, says he, it has been classed among the insects of this country. It certainly visited Great

Britain in the year 1768; and several small flocks of them were seen in the environs of London. Lady Aylesford gave a living specimen to Mr. Donovan, which was found in a barley-field near Packington, in Warwickshire. It lived several days after its arrival in London, and would probably have survived much longer, but that it was injured on the journey, and weakened by long confinement.

There are some variations in the dates named by different authors. As to their appearance near London —for instance, Bucke says, "In August 1748, many swarms of this insect were seen flying in different parts of London—they soon disappeared. The numbers and extent of their flight are prodigious. Mr. Moon records a flight in India which extended 500 miles; and Mr. Barrow describes one in Africa which occupied an area of 2000 miles."

Their flight is but slow and heavy, for the locust flies but a short space above the ground, unless opposing objects intervene, and cause it to rise higher. In their migrations, which in 1774 devasted Siebenburgen and Hungary, and which even advanced as far as Vienna, swarms were observed several hundred fathoms thick, one of which occupied four hours in passing a high tower, and thus long at least must every individual have flown. The intelligence of an American newspaper is still more striking, which relates that the ship Georgia, upon its voyage from Lisbon to Havannah, on the 21st of November, was in the vicinity of the Canary Islands, but yet two hundred English miles from land. A calm came on, which was succeeded by a light wind from the north-east. Now, for the space of a whole hour, locusts fell upon the ship and the surrounding sea, which covered its entire surface; yet they were not at all fatigued, but jumped, and endeavoured to escape their pursuers. If we even conclude that these locusts were conveyed a considerable distance from land by high winds, yet must a greater portion of their journey be ascribed to their own continuous muscular power, for otherwise they would have fallen much earlier into the sea; but as the abated wind no longer supported their flight like the violent one, their strength decreased, and they fell down.

Locusts and grasshoppers produce their chirp by applying the hind shank to the thigh, rubbing it smartly against the wing-case, and alternately the right and left legs. They have also, like the grylli, a drum for augmenting the sound. On each side (says De Geer,) of the first segment of the abdomen, immediately above the origin of the hind-thighs, there is a large deep opening, somewhat oval in form, and partly closed by an irregular flat plate or lid, of a hard substance, but covered by a flexible, wrinkled membrane. The opening left by the lid is in the form of a half-moon, and at the bottom of the cavity is a white membrane, shining like a mirror, and tensely stretched. On the side of the opening, towards the head, there is a small oval hole into which the point of a pin may easily pass; and when the membrane is removed, a large cavity is brought into view. The whole of this apparatus seems to contribute much, both to produce and increase the sound caused by the insects. Its resemblance to the hole in a military drum, as well as in violins and guitars, is striking. On stopping up this hole with a bit of wafer, it was found that the insect could no longer produce its peculiar sound, but only a sort of muffled scraping. Swammerdam describes this curious mechanism of creation as, "two small drums, like the drum of our ear, which, being struck by the help of two lanulated cartilages, vibrate the air in such a manner as to produce the sound."

Like spiders, and many other insects, locusts and grasshoppers are very assiduous in cleaning their limbs. Their activity in smoothing their antennæ and other organs, and biting off every film or particle of dust adhering to them, led some naturalists to suppose that they chewed the cud: but this is a mistake. It is indispensable in these, as in all insects which walk against gravity, to keep the suckers, or cushions of their feet, free from all extraneous defilement.

Truly may we learn much from the insect world around us! For who does not know that arduous work, whether bodily, mental, or spiritual, can only be well executed by those who "wash their hands in innocence, and walk in the way of righteousness"?

These insects come into the catalogue of animals permitted for food, Levit. xi. 20, 22. Strange as this permission to eat locusts may appear to the English reader, yet nothing is more certain than that several nations, both of Asia and Africa, anciently used these insects for food, and still do so. Ludolphus, Dr. Shaw, and all the modern travellers, mention the custom of eating them, fried and salted. "Locusts," says Jackson, in his account of Morocco, "are esteemed a great delicacy; and during the time of their swarming, dishes of them are generally served up at the principal repasts. There are various ways of dressing them; that usually adopted is, to boil them in water half-an-hour, then sprinkle them with salt and pepper, and fry them, adding a little vinegar. The head, wings, and legs are thrown away; the rest of the body is eaten, and resembles the taste of prawns. As the criterion of goodness in all eatables among the Moors is regulated by the stimulating qualities which they possess, so these locusts are preferred to pigeons, because supposed to be more invigorating. A person may eat a plate-full of them, containing two or three hundred, without any ill effects.

We saw locusts, says Niebuhr, put into bags or on strings in several parts of Arabia. In Barbary they are boiled, and then dried upon the roofs of the houses. The Bedouins of Egypt cruelly roast them alive, and devour them with the utmost voracity. All Arabians eat locusts. The Turks, on the contrary, have an aversion to the food, but if the Europeans express the same, the Arabians remind them of their fondness for frogs, &c. The *marked,* or red locust, is preferred, as the fattest and most delicate species.

The *dubbe,* another species, is not deemed esculent, because it tends to produce diarrhœa. The flesh of the locust is said to resemble the small sardine of the Baltic.

Hasselquist says, "They who deny insects to have been the food of that holy man (John the Baptist) urge that this insect is an unaccustomary and unnatural food; but they would soon be convinced of the contrary, if they would travel to Egypt, Arabia, or Syria and take a meal with the Arabs. Roasted locusts are at this time eaten by the Arabs at the proper season, when they can procure them; so that in all probability this dish has been used in the time of St. John. Ancient customs are not here subject to many changes; and I was assured by a judicious Greek priest, that their church had never taken the word in any other sense than that of locusts; and he even laughed at the idea of its being a plant or a bird. The species chosen for food is the *gryllus christatus*, or Egyptian locust, which is of far superior magnitude than the *gryllus migratorius*. Its body is either red or brownish-green, with crested thorax and variegated wings; the legs incline much to red; the under wings are in some specimens reddish; in others, of a pale brown, with numerous arrow-shaped blackish or greenish spots.

Mr. Adamson says, in his voyage to Senegal, &c. after describing a large flight of them which he saw the third day after his arrival at Goree:—"On would not imagine that so shocking an insect a the locust should ever be food for man. And ye it is an undoubted fact, that in several parts of thi country the people eat of it; nay, they have differen ways of dressing this extraordinary dish. Some pound them, and boil them with milk; others only broil them on the coals, and think them excellent food. There is no disputing of tastes; but," says he, "for my part, I should willingly resign whole clouds of locusts to the negroes of Gambia, for the meanest of their fishes."

Dr. Russell says, that locusts, although an article of food in other parts of Syria, are not eaten by the Arabs near Aleppo.

It has been already said that the ancients were acquainted with this food of the Africans, and they distinguished a particular tribe by the name of *acridophagi*, or locust eaters. They made large fires to intercept their flight; they collected and salted them, thus preserving them palatable till the season for again collecting them returned.

The *cicada*, which are in many respects allied to the locusts, were eaten by the ancients. Spacman says, that the Hottentots are highly rejoiced at the arrival of locusts in their country, although they destroy all its verdure; eating them in such quantities as to get visibly fatter than before. Clenard says, that they bring waggon-loads to Fez, as a usual article of food.

In China, these creatures are given as meat to favourite birds, such as the *paradisea apoda.*

It is then a well-ascertained fact, that in Arabia and North Africa, they *are* used as food, as well as in former times; and if some modern travellers have doubted the circumstance, it only affords an instructive instance of over-hasty scepticism.

It has been remarked, says Burckhardt, in his notes on the Bedouins and Wahabys, that these destructive creatures are found in Egypt, all along the river Nile, as far as Sennaar, in the Nubian, and in all parts of the Arabian deserts. Those that I have seen in Upper Egypt, come all from the North; those that I saw in Nubia were all said to have come from Upper Egypt. It seems, therefore, that such parts of Africa are not the native places of the locusts. In the year 1813, they devoured the whole harvest from Berber to Shendy, in the Black Countries; and in the spring of that same year, I had seen whole flights of them in Upper Egypt, where they are particularly injurious to the palm-trees. These they strip of every leaf or green particle, the trees remaining like skeletons with bare branches.

In Arabia the locusts are known to come invariably from the East, and the Arabs accordingly say that they are produced by the waters of the Persian Gulf. The province of Nedjd is particularly exposed to their ravages; they overwhelm it sometimes to such a degree, that having destroyed the harvest, they penetrate by thousands into the private dwellings, and devour whatever they can find, even the leather of the water-vessels. It has been observed, that those locusts which come from the East are not considered so formidable, because they only fix upon trees, and do not destroy the seed; but they soon give birth to a new brood, and it is the young locusts, before they are sufficiently grown to fly away, that consume the crops. According to general report, the locusts breed as often as three times in the year.

The Bedouins, who occupy the peninsula of Sinai, are frequently driven to despair by the multitude of locusts, which constitute a land plague, and a most serious grievance. These animals arrived by way of Akaba, therefore, from the East, towards the end of May, when the Pleiades are setting, according to observations made by the Arabs, who believe that the locusts entertain a considerable dread of that constellation. They remain there generally during a space of forty or fifty days, and then disappear for the rest of the year. Some few are seen in the course of the year, but great flights every fourth or fifth year; such is the general course of their unwelcome visits. Since the year 1811, however, they have invaded the peninsula every successive season for five years, in considerable numbers. All the Bedouins of Arabia, and the inhabitants of towns in Nedjd and Hedjaz, are accustomed to eat the locusts. I have seen, at Medinah and Ayf, locust shops, where these animals were sold by measure. In Egypt and Nubia they are only eaten by the poorest beggars. The Arabs, in preparing locusts as an article of food, throw them alive into boiling water with which a good deal of salt has been mixed; after a few minutes they are taken out, and dried in the sun; the head, feet, and wings, are then torn off, the bodies cleansed from the salt and perfectly dried; after which process, whole sacks are filled with them by the Bedouins. They are sometimes eaten broiled in butter. The Bedouins of Sinai alone do not use the locusts as an article of food.

When Captains Irby and Mangles were travelling round the southern extremity of the Dead Sea, in the end of May, they had an opportunity of observing these depredators. "In the morning," say they, "we quitted Shobek; on our way we passed a swarm of locusts that were resting themselves in a gulley; they were in sufficient numbers to alter apparently the colour of the rock on which they had alighted, and to make a sort of crackling noise while eating, which we heard before we reached them. Volney compares it to the foraging of an army. Our conductors told us they were on their way to Gaza, and that they pass almost annually."

In Mr. James Tweedie's letter to Sir William Hooker, describing his journey across the Pampas, he says, "Two miles after quitting Sant Iago, I observed a red cloud rising in the south-west; it was an immense flight of red locusts, which, passing over us, made the sun appear like blood. Next day, the wind having shifted, these insects were driven again on our line of road, where they were mostly resting on the tops of the trees, which looked as if studded with red blossoms."

"There is a great scarcity of provisions," says Burckhardt, in his Travels in Nubia, "in the Nile countries, from Gour up to Sennaar, occasioned by the locusts, who devoured entirely the last winter crops. The envoys sent last year by Mohammed Ali to the king of Sennaar, who have returned with the late caravans, describe the state of the inhabitants as most deplorable; they kill each other for a measure of dhourra, and neither law nor government is any more attended to. Under such circumstances the caravans assembled at Daraor, in the neighbourhood of Assouan, have not thought proper to leave Egypt.

"We again met great numbers of locusts. These rapacious insects had spread sometimes in such quantities over the mountain as to eat up every green vegetable; the cattle of the Bedouins are sometimes reduced by these animals to the greatest distress."

And again,—"Locusts are always seen in Taka, which seems to be their breeding place, from whence they spread over other parts of Nubia. However innumerable their hosts may be, they appear to be incapable of destroying the verdure of this country, as sometimes happens in Egypt and Syria. Those I saw were of the largest size, with the upper wings of a red, and the lower of a yellow colour.

"After marching three hours farther, or five hours from our starting, we halted in a wady of douar trees, where our slaves killed and ate a quantity of locusts.

"Ascending by a pass in chalk, with superior pored gravel beds, we reached Yasinjah, where were large flocks of the locust-eating thrush (*turdus roseus*).

"The first week in May the fine weather set in; the thermometer averaged †20°; the flood of the Tigris was now steady from the melting snows. Young locusts made their appearance, and flocks of locust-birds (*seleucidæ* of Pliny) follow; the bounty of Providence sending the cure with the evil."

Captain Keppel says, "We traversed the grand steppe or desert of Astrakhan for two days. On the evening of August 1st, we arrived at a Russian village, which was surrounded by a considerable tract of well-cultivated land. While changing horses, I witnessed what was to me a very curious sight. A vast flight of locusts, extending fifteen miles, suddenly made their appearance from the east, and came in a huge phalanx to attack the crops. In an instant every villager was on the road to his own field. Some took dogs, others were on horseback, and others ran shouting and clapping their hands all the way, the inhabitants finding from experience that the locusts very much dislike noise. My fellow-traveller told me, that in the colony of Karass, when the locusts come in sight, not only all the inhabitants, but the military turn out, and endeavour to drive them off, by drums and fifes, and a perpetual discharge of musketry. The enemy thus repulsed, make a speedy retreat, and commit their depredations on the land of those who are less on the alert to resist them."

There is one genus of the locust tribe called the *fulgosa*, the remarkable characteristic of which is, the horn bladder on the forehead, which in the following speci diffuses a clear light during life, and some time aft death.

Lanternaria, or lanthorn-fly, is the largest specie The shining bladder is almost as large as the who body, and gives such a clear light, that the natives Guiana use them as lanthorns.

The light in these species may be more particular described as included in a hollow sub-transparent pr jection of the head, a kind of proboscis. Splendid i deed must be the appearance of a tree thus singular adorned and studded by so many sparkling stars. I the *fulgosa lanternaria,* the light, perhaps, transcen that of any other luminous insect. Mdlle. Meri says, "it is sufficient to read a newspaper by." M Murray says he has read a letter by the exclusive lig of the *lampyrus noctiluca;* and, alighting one night the Italian side of the Simplon, near to the white ma ble quarry, he picked up a *lampyris splendidula.* shone with intense light. The night was dark; a it showed him distinctly the hour by a watch.

The use to which it is subservient in the anim economy, is difficult to ascertain—"We see in part Its very existence, however, proves that it is a con tion indispensable to its being. Divine Providence has tipt the insect with living fire—a non-material ignition; burning, yet not consumed; even extinguished by a temperature which the animal system, with which it is so singularly interwoven, cannot withstand. It may be "a lamp to its path," to guide it to its food, subserving the additional purpose of warding off its enemies; while it may also be the luminous point that directs the nightingale to its proper prey.

> "But 'twas the self-same Power Divine,
> Taught you to sing, and me to shine;
> That you with music, I with light,
> Might beautify and cheer the night."

I think you will all remember this beautiful little fable of Cowper's; and how glad we feel when told that the bird "found its supper somewhere else." You must allow for the little poetical licence taken in changing a glow-worm into a glowing gryllus.

This creature makes a noise somewhat between the grating of a razor-grinder and the clang of cymbals; so loud also, that it is called scare-sleep by the Dutch in Guiana. It is probably the same, or a similar species, which Ligou tells us makes a great noise in the night, at Barbadoes. "They lie," he says, "all day in holes and hollow trees, and so soon as the sun is down, begin their tunes, which were neither singing nor crying, but the shrillest noises I ever heard. Nothing can be so nearly compared to it as the mouths of a pack of small beagles, at a distance. So lively and chirping the noise is, if there were not too much of it; for the music hath no intermission till morning, and then all is hushed." Possibly he may allude to another insect, *tettigonia septendecim,* which is said to visit Philadelphia in the month of May, every seventeen years, in numbers almost incredible, and makes so loud a noise, that people are stated not to be able to hear each other speak.

Among the numerous insects of the genus *gryllus,* hardly any can be adduced of an appearance more remarkable than the *monstrosus,* which is a native of India, and belongs to the same tribe with the *gryllus gryllotalpa,* or mole-cricket, to which, in its habits of life, it is probably similar. Dr. Sutton says that this species also exhibits light. When the wings are fully expanded, it has an elegant appearance. There is of this character, the *gryllus subfuscus,* or brownish locust, with its wings twisted at the tips, and the feet appendiculated on each side. The *gryllus monstrosus,* or spiral-winged Indian locust: head inflected, armed with jaws, and furnished with feelers; antennæ generally setaceous, or filiform; wings four, deflected and convoluted, the lower ones plaited; hind-legs formed for leaping; claws on all the feet double.

The *gryllus viridis* is the common green locust, with very long setaceous antennæ, and a subferruginous line down the thorax.

The generic character of this species has head inflected, armed with jaws, and furnished with feelers; antennæ in most species setaceous, or filiform; wings four, deflected and convoluted, the lower ones plaited; hind-legs formed for leaping; claws on all the feet double, and edged with black.

Gryllus dut, is a superb insect, in size and general appearance very nearly allied to the *gryllus cristatus,* or great Egyptian locust, from which it differs, in having the lower wings of a beautiful red colour, edged with black, and marked with numerous arrow-shaped spots of the same colour. It is a native of South America; and was first described by Mr. Drury.

Gryllus verrucivorus, or brown-spotted locust, is not uncommon in most parts of Europe, and is of nearly equal size with the *gryllus viridissimus,* or large green locust, which it also resembles in its general manner of life. In some parts of Sweden, as Linnæus informs us, the country people make use of it as a remedy against warts, suffering the insect to eat off those excrescences from their hands, which, by this method, as is pretended, are effectually freed from these blemishes. Possibly this is effected by the acrid secretion it instils into the wound it makes with its mandibles. Its colour is green, with brown spots; smooth squarish thorax, and setaceous antennæ of the length of the body. Of this kind, there is also the variegated European locust.

Gryllus caerulescens, or caerulescent locust, is brown, with subcristated thorax and blueish-green under-wings, marked by a black bar. It is principally found in the southern parts of Europe.

Gryllus nasatus, or long-fronted locust, is a native of various parts of Africa. Of these there is the green locust, with conical head, and hand-shaped antennæ, and the long-headed African locust.

Gryllus squerrosus, or triple-spined locust, is a native of several parts of Africa. It has three triple-spined protuberances on each side the thorax; the elytra, or upper wings green, the lower red, all speckled with black.

The *gryllus pupus,* or pupal locust, is a native of the interior of Africa. It is a yellowish brown apterous locust, with thick body, and spiny thorax, sometimes thence called spiny African locust. It seems in some degree doubtful whether this insect be known in its complete or ultimate state; those that have been figured by Boeral and others being totally destitute of wings.

Gryllus elephas, or the elephant locust, a greenish apterous locust, clouded with brown, and rufous; the body roughened above with spiny processes. It is like the *gryllus pupas*, remarkable for the want of wings. Like that insect also, it is a native of the interior parts of Africa. The rough-bodied African locust of this species is olive green, tinged in some parts with red.

Gryllus serratus, or the serrated locust, is an inhabitant of the lower parts of Africa, and by no means uncommon at the Cape of Good Hope. It is green, with compressed serrated thorax, and green abdomen.

Gryllus lamifolius, or bay-leaved locust, has obtained its name from the strong general resemblance which the upper or outer wings bear to the leaves of the bay-tree. Several species in the genera of gryllus and mantis are highly remarkable for this leaf-like appearance, which seems intended in some measure as a security to the animals from the attacks of birds and other creatures while seated amongst the foliage of the trees which they frequent. This species is a native of many parts of America. It has, like all the grylli, four wings, the inferior overplaited; the hind-feet formed for leaping. Claws on all the feet double.

Gryllus citrifolius, or citron-leaved locust, is the largest species of all that tribe of the genus gryllus. The thorax is of a somewhat quadrangular form, and crenated on the edges, with very large green leaf-like exterior wings. It is a native of various parts of India.

The *gryllus domesticus*, or, as some call it, the *achata domestica*, or house cricket, has its wings tailed, and longer than the wing cases; body glaucous; head inflated, armed with jaws; feelers filiform; antennæ usually setaceous, or filiform, of a yellowish brown colour. Few insects are more familiar than the common cricket. It frequents houses, and is specially fond of warmth, even to a suffocating degree. It is superstitiously welcomed by many as a lucky inmate. It is indeed of inoffensive manners, except from the incessancy of its chirping. Some think its note louder before rain than at any other time. Geoffroy says,—"This noise is occasioned by the friction of its thorax against the head and wing-cases."

Associated as the sound is, either with the snug chimney-corner or the sunshine of summer, it affords a pleasure which certainly does not arise from the intrinsic quality of its music. "Sounds," it is well observed by White, "do not always give us pleasure according to their sweetness and melody; nor do harsh sounds always displease. Thus the shrilling of the *achata campestris*, field cricket, though sharp and stridulous, yet marvellously delights some hearers, filling their minds with a train of summer ideas of everything that is rural, verdurous, and joyous."

> "Sounds inharmonious in themselves, and harsh,
> Yet heard in scenes where peace for ever reigns,
> And only there, please highly for their sake."
>
> *Cowper's Task.*

A woman who disliked their music, and had in vain tried to banish or silence them, at length succeeded by accident. Having one day invited several guests to her home to celebrate a wedding, she procured a band of music, with drums and trumpets, to entertain the company. This music was so much greater than the crickets had been used to, or could imitate, that they instantly took to flight, and were never afterwards heard in the house.

Cats catch hearth-crickets, and, playing with them as they do with mice, devour them. A small grey species at the Cape is called by the colonists the Hottentot's god. It is certainly held in some degree esteem by the Hottentots, so that they will not w lingly hurt it, and they deem that person fortunate whom it may chance to settle.

The *gryllus campestris,* or field cricket, inhab every country in Europe, but is observed to be m abundant in the southern parts than elsewhere. T noisy chirpings of this singularly formed little creat are oftentimes heard issuing from among the busl and underwood, in the skirts of forests, and in t fields, towards the approach of twilight, particula when the weather is warm, and the air serene; but t insect itself is very seldom seen. It is remarkal timid, and scarcely ever ventures from its lurki place among the bushes, till the darkness of the nig emboldens it to ramble out in quest of food. chirping noise does not continue all the year. It co mences in May, and ceases about the end of Autun Its body is blackish. Its wings, which are four, a shorter than the wing-cases, are of a yellowish-brov Although you hear it occasionally in the hedge-ba in summer, it prefers the warmth of an oven or a g fire; and thence, residing as it were always in t torrid zone, it is ever alert and merry; a good Chri mas fire being to it what the heat of the dog-days to others. Though crickets are frequently heard by day, yet their natural time of motion is only in the night. As soon as it becomes dark, the chirping increases, and they come running forth, and are often to be seen in great numbers, from the size of a flea to that of their full stature. They are sometimes kept for their music, and the learned Scaliger took so great a fancy to their song, that he was accustomed to keep them in a box in his study! It is reported that in some parts of Africa they are kept and fed in a kind of iron oven, and sold to the natives, who like their chirp, and think it a good soporific. The instrument upon which the male cricket plays (for the female is mute) consists, as in the preceding case, of strong nervuses or rough strings in the wing-cases, by the friction of which against each other, a sound is produced, and communicated to the membranes stretched between them, in the same way that the vibrations caused by the friction of the finger on the tambourine are diffused over its surface.

The *gryllus rufus* has, at first sight, a strange resemblance to some species of butterfly; it is very common in sterile fields in various parts of Europe, and observed in abundance in the Battersea meadows near the river, in the month of September. Body blackish, abdome reddish; antennæ sub-clavated and pointed.

The *gryllus sabulatus* is an interesting and curiou little species. It is found in Britain; but is rare. Leg are short, except the posterior pair, which are forme for leaping. Head ovate and inserted. The body i of an olive-brown colour. The wings, which are ver short, of a yellowish hue.

The *gryllus viridissimus*, or great green locust, is th largest and most elegant of the British species. It i not very uncommon in fields and hedges towards th decline of summer. In autumn the female deposit her eggs beneath the surface of the ground, and fro these, in the following spring, are hatched the young which, after casting their skin several times during th different periods of their growth, at length acquir their wings, and become complete. During the summe months, it is by no means sparing of its stridulou music, but instantly ceases to crink the moment i hears a foot-fall; and hence it is not easy to discove the spot where it is, unless it be approached in th most cautious manner, for it is silent if a perso approach within several yards of it. Brunelli, a Italian naturalist, tried some experiments upon thi insect, which proved more satisfactory than those of Bonnet. He kept several in a chamber, which continued their crinking song through the whole day; but the instant they heard a knock at the door, they were silent. He subsequently invented a method of imitating their sounds, and when he did so outside the door, at first a few would venture upon a soft whisper, and by-and-bye the whole party burst out in chorus to answer him; but upon repeating the rap at the door, they instantly stopped again as if alarmed. It is remarkable that the males alone of these insects are musical. We may remark *en passant*, that Brunelli's insect has very long antennæ. These sounds are doubtless intended as signals to their companions, who, of course, must possess organs of hearing. Degeer says, with regard to these insects, our male green field-hoppers have a round plate in that part of the right wing-case which is folded horizontally over the trunk. This plate is made of very fine transparent membrane, resembling a little mirror or piece of talc, and as tense as a drum. It is surrounded by a strong and prominent nervuse, but is concealed under the fold of the left wing-case, where also there are strong nervuses corresponding to what may be called the hoop of the drum. It is exceedingly probable that the quick motion with which the insect rubs these nervuses against each other, produces a vibration in the membrane, whence the sound is augmented. By alternating the motion rapidly from right to left, the sound is produced in an almost continued strain; while in the crickets who alternate the motion more slowly, the sound is emitted at interrupted intervals, a remark which every person may readily verify.

The *gryllus morbillosus*, or granulated locust, has the same generic character as the common locust. Its specific character is as follows: Square, red-warted thorax, brown wing-cases spotted with white, and red wings.

One kind differs in the colour of the upper wings, which, instead of being spotted with white, are of an olive-green, with very numerous dusty specks. It is a native of the lower parts of Africa, and some parts of South America. There is also the spotted Cape locust of the same species.

The smaller species of locust, constituting the grasshoppers of our fields and meadows, have not been much attended to by entomologists; and their characters are but ill-defined. Many of them too are subject to much variation of colouring, so as to render the distinguishing of species difficult. Perhaps their different notes might assist much in the determination of this last point, since each has its own peculiar way of producing the chirp, or, as White calls it, the *crink*. During hot weather, many field grasshoppers will chirp during the greater part of the night.

The *gryllus flavipes*, or yellow-legged grasshopper, is uncommon; but found in Britain as well as in other parts of Europe. It is peculiar to marshy places. The thorax and wing-cases are brown; anterior margin greenish-yellow; posterior thighs yellow, beneath sanguineous; shanks yellowish.

The *gryllus biguttulus* is a native of Great Britain; it is not unfrequently found near London. It is found in other parts of Europe. Head and thorax dark brown, marked with lines of white, wings pale brown, edged with yellow; and several whitish marks near the extremity; body beneath and legs brown. It is taken in the perfect state in the month of August.

The *locusta varia*, or *thalapina*, is also a native of Great Britain and other parts of Europe. The antennæ very long, thorax green, with a longitudinal line of yellow; anterior wings membranous green; posterior wings very delicate pale green; body pale green, with the three last joints pale black. It is very plenty in the month of August, is concealed among the foliage of the lower branches of the oak in the day-time, and is not often observed to fly except when the morning dew is on the herbage, or evening approaches; leaps if disturbed.

The *gryllus gryllotalpa,* or mole cricket, is a native of Great Britain, and is a very curious and destructive insect. Its shells, or upper wings, are semi-crestaceous, incumbent on each other, beak curved down. Head maxillous, and with palpi; antennæ filiform, or taper; wings folded; hind legs strong for leaping. It is of a dark brown, the body hairy; two small tails; fore-feet large and palmated. It lives in burrows, which it forms about an inch or more below the surface of the ground, and is ingeniously covered at the top with loose earth. When the young larvæ are first hatched, they scarcely exceed the twelfth of an inch in length. They ascend through the opening, and subsist on the plains nearest their habitation, till their fore-claws have acquired sufficient strength to burrow into the earth. In the larva state they nearly equal the perfect insect in size, and resemble it in every respect, except that they have no wings. The shells appear first: this is the pupa state, and shortly after the membranous wings appear also. It makes very little use of its wings, as they are too weak to support its body long, and has not much occasion for them, as it lives in the same manner as the mole, and, like it, is furnished with powerful claws, with which it can burrow through the ground to a very considerable distance. This destructive creature is generally found in great numbers wherever they once deposit their eggs; for it is impossible to pursue and destroy them without doing much injury to the ground they infest. If they find a way into a kitchen garden, they sometimes destroy whole beds of young plants in the space of one night; and this is not astonishing, when we consider that they seldom eat any part except the roots, which they nip very close, and consequently the other parts must perish. They seem particularly fond of lettuces.

The locust most common in Barbadoes is there called the ash-coloured grasshopper. It is generally to be seen among the blades of sugar-canes; and when the Guinea corn is ripe, they feed much upon it. The most ignorant and superstitious of the inhabitants are very apprehensive of some approaching illness to the family, whenever they fly into their houses in the evening, or in the night. The green grasshopper is also common in Barbadoes.

The males of the cicada make a sound like the grasshopper, which they produce by means of some complicated organs placed on the abdomen. It is remarkable that some species of *clavarice* (parasitic fungi) grow in abundance on the nymphæ of the cicadæ, and also in the living body of their larvæ; an[illegible] is particularly plentiful in Italy and Greece. The most common species, *cicada plebeia,* appears in the hotter months of summer, and continues its shrill chirping during the greater part of the day, sitting among the leaves of the trees. In Italy, there is another species (the *cicada orni*), which bears a very general resemblance to the former, but is considerably less. Indeed, among the larger cicadæ, there are several sorts, which, though really distinct, are yet so very nearly allied to each other, as to be easily regarded, on a cursory view, as the same species. All the cicadæ proceed from eggs, which are deposited by the parent insects in and about the roots of trees, near the ground. They hatch into larvæ, which, when grown to a certain size, are the tettigometræ of the older writers. These larvæ, after having continued in this state two years, cast their skins, and produce the complete insects.

In our own country we have several species of this genus, which, however, are extremely small, and are not distinguished by any sound sufficient to excite attention.

Very different opinions appear to have been held of the music of the celebrated tettix of the Grecian poets. "In the hotter months of summer," says Dr. Shaw, "especially from mid-day to the middle of the afternoon, the cicada, tettix, or grasshopper, as we falsely translate it, is perpetually stunning our ears with its most excessively shrill and ungrateful noise. It is in this respect the most troublesome and impertinent of insects, perching upon a twig, and squalling sometimes two or three hours without ceasing; thereby too often disturbing the studies or short repose that is frequently indulged in in these hot climates, at those hours.

Sir J. G. Smith also calls it a most disagreeable, dull chirping. Smeathman says, that a cicada may be heard to the distance of half-a-mile; and that the singing of one in a room will immediately silence a whole company. And the Swedish naturalist, Thunberg, tells us that a Javanese species makes a noise as shrill and piercing as if it proceeded from a trumpet. Yet there cannot be a doubt that these loud songsters were the tettiges of the Greeks, and were placed upon a harp as the emblem of music, because, when two rival musicians (Eumonius and Ariston,) were competing upon the harp, a tettix, flying to the former, and sitting upon his harp, supplied the place of a broken string, and so secured to him the victory. Madlle. Merian says, that the music of another species, *tettigonia tibicea,* is thought to resemble the sound of the harp so nearly, that the Dutch actually call it the harper.

The Grecian poets not only praised the music of the cicada, but imagined that it fed on dew, and lived in perpetual youth—fictions, however, altogether poetical and visionary; for, like the rest of this order, it feeds on herbage and leaves; and so far from being long-lived, it is not supposed to survive its arrival at maturity more than a week or two. It is pleasant, after so many conflicting opinions, to come to so sunny a passage as this, from the elegant pen of the accomplished Lord Lindsay. Writing from his boat, he says, "The incessant hum of insects, and hiss of grasshoppers, singing in the trees as happy as kings, after breakfasting on the dews of Mount Gilead, and the thought that gave a zest to it all, that this *was* Mount Gilead, made up a full cup of enjoyment, which I did quaff with my very soul."

Truly all poets—for those with poetic minds may be classed as such—feel alike that—

"Not rural sights alone, but rural sounds,
Exhilarate the spirits, and restore
The tone of nature's languid beauty."

The *cicada septemdecim,* or American locust, is at all times very common in Pennsylvania; but at certain periods (generally of fourteen or fifteen years,) the numbers are so immense, that it has obtained the general appellation of locust. Towards the end of April, these insects emerge from the ground; and their appearance is always to be predicted by the swine searching for them. The swarms are sometimes so great, that, in the places from whence they have risen, the earth appears nearly as full of holes as a honey-comb. They always leave the ground during the night. On their first coming out, they are in their chrysalis state; but very soon afterwards the back bursts, and the flying insects disengage themselves from their case. In a little while they are entirely white, with red eyes, and seem very weak and tender; but, by the next day, they attain their full strength and perfection, being of a dark brown colour, with four finely-varied transparent wings.

They are very active, flying about from tree to tree with great agility. The female lays her eggs about the latter end of May, piercing for this purpose the tender twigs of trees with the dart from her tail. With this she is able to penetrate the wood in a surprisingly expeditious manner, crowding it, for the length of two or three inches, full of eggs, ranged in close lines, with from twelve to eighteen in each. She always darts to the pith of the branch, in order that the larvæ, when they proceed from the eggs, may find food proper for their tender state. When these are full-grown, they drop off, and *make their way into the ground, to prepare for a change.* Here they are sometimes found at the depth of two feet or upwards. For the sake of experiment, some of the eggs of this species, about the usual time of hatching, were taken out, and spread upon a table. In about an hour they cracked; and it was very entertaining to observe how the little insects contrived to disengage themselves from the shell. When they had got clear from all incumbrances, they ran about very briskly, evidently searching for a repository in the earth.

Very shortly after attaining their perfect state, these insects always spread over the country for many miles round. They are excessively voracious, and do infinite damage in their periodical swarmings, to both orchard and forest trees; and were it not for the number and voracity of their enemies, and the naturally short duation of their lives, the inhabitants would often suffer om them all the horrors of famine.

It seems to have been of these insects that Mr. Iughes says such vast swarms were bred, or came into he island of Barbadoes, in 1744 or 1745, that they estroyed almost every green and tender plant. So reat was the destruction that they caused, especially pon the potato bines, on whose roots the poor people hiefly subsisted; and such was the scarcity of food occaioned by them, particularly in the parish of St. Philip, hat a collection was made for the sufferers through he rest of the island.

Domestic fowls are fond of them; and even some of he American squirrels become fat with them at the imes when they are very abundant. The Indians also luck off their wings, and boil the bodies for food. It s said that they may be kept from the trees, by susending on the branches pieces of tow, impregnated vith a mixture of brimstone and train-oil.

The black-headed frog-hopper, or *cicada spumaria.* The larvæ or grubs of this insect are well-known as lischarging from their bodies, upon the branches and eaves of plants, a kind of frothy matter, called by the ountry people in England, *cuckoo-spit.* In the midst of this they constantly reside, probably for shelter against the rapacity of such stronger insects as would otherwise prey upon them. Nature seems to have afforded this kind of defence to the insects, as their naked and soft bodies might otherwise very easily be injured: perhaps also the moisture of this foam may serve to secure them from the sultry beams of the sun. On removing the foam, the grub is discovered underneath, but it will not remain long uncovered. It soon emits fresh foam that again hides it from the eye of observation. It is in the midst of its foam that the larva goes through its metamorphosis to a chrysalis, and a winged insect. This may be observed by any person who is careful enough to watch when the froth begins a little to subside. At this time he must put the insect with its leaf under a glass. The froth, degenerating to a white film, fixes the creature to the leaf; soon after this the fly may be seen first putting out its head, and afterwards, by degrees, its body. As soon as the fore-part is out, a small protuberance will be perceived on each side, which, every moment growing larger, will soon appear to be the wings of the fly unfolding by degrees. In about a quarter of an hour the whole change is completed, the fly is liberated, its wings are extended over its body, and the fine silver-like case of the larva, with all its legs and other apparatus, will be seen left behind. The perfect insect is of a brown colour, and has on the upper wings two lateral whitish spots. It is very common in meadows and pastures, and is so agile, that, when attempted to be caught, it will sometimes spring to the distance of two or three feet.

The Chinese are indebted to a species of *cicada* for a white wax which is much valued. The larva of the *cicada limbata* forms a sort of grease, which adheres to the branches of trees, and hardens into wax. In autumn the natives scrape it from off the trees, melt, purify, and form it into cakes. It is white and glossy in appearance, and, when mixed with oil, is used to make candles, and is said to be superior to the common wax for use. Sir George Staunton says, that he saw them busily employed upon the small branches of a shrub. They did not much exceed the domestic fly in size, and were of a very singular structure. They were in every part covered with a kind of white powder, and the branches they most frequented were entirely whitened by this substance strewed over them.

Let us now see what enemies these powerful little creatures have; for were it not for these, they might indeed overspread the earth and entirely deface its beauty; but the harmonious wisdom of Him who made all things, keeps them within their bounds, and appoints means among other creatures for their restraint.

The locustelle, *alanda trivalis*, or grasshopper-lark, is smaller than the common wren; of a brownish-yellow colour, spotted with black; the tail is long and brown, and the belly and thighs are variegated with oblong streaks of a blackish-brown. This bird feeds on insects, and emits the same kind of sound as the grasshopper, only considerably louder. It usually perches on the top of some prickly shrub; and vibrating its tail very briskly, chirps without intermission, particularly during the summer evenings; however, it is seldom heard after the middle of August.

Mr. White, in his delightful work,* gives a graphic description of this bird's note and habits.

"The grasshopper-lark, says he, began his sibilous note in my fields, last Saturday. Nothing can be more amusing than the whisper of this little bird, which seems to be close by, though at an hundred yards distance; and, when close at your ears, is scarce any louder than when a great way off. Had I not been a little acquainted with insects, and known that the rasshopper kind is not yet hatched, I should have ardly believed but that it had been a *locusta,* whisper- g in the bushes. The country people laugh when u tell them that it is the note of a bird. It is a most tful creature, skulking in the thickest part of a bush; d will sing at a yard distance, provided it be concealed. was obliged to get a person to go on the other side o e hedge where it haunted; and then it would run, eeping like a mouse, before us, for an hundred yards gether, through the bottom of the thorns; yet it uld not come into fair sight: but in a morning rly, and when undisturbed, it sings on the top of a ig, gaping and shivering with its wings.

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* Natural History of Selborne.

Dr. Russell says, "The locust-bird appears at Aleppo June, about the time the white mulberries are ripe, d it feeds upon that fruit, at a time when no locusts e to be found. It may be remarked that the *smurmur* es not alone eat locusts; starlings, sparrows, and allows, likewise devour them. In the great cities of e east, particularly Damascus and Aleppo, they take e to be provided with a certain water from the untry whence the locust-birds come; as they affirm t they know by repeated experience, that so soon as s water is stirred these birds arrive in large flocks, if attracted by its odour. They are much respected by the Turks, on account of their destroying the locusts.

The *lanius collurio*, one of the butcher-birds, is among the worst and cruellest foes of the locust, though they do not confine their cruelties to this insect. When it sees a locust, or mantis, or a small bird, it springs upon it, and immediately carries it off in order to impale it on a thorn, which it does with great dexterity, always passing the thorn through the head of its victim. It thus continues all day long its murderous career, apparently instigated rather by the love of mischief than the desire of food. Its throne of tyranny is usually a dry and elevated branch of a tree, from which it pounces on all intruders, and impales the inexperienced alive. When hungry it visits its shambles, and helps itself to a savoury meal. The Hottentots assured Le Vaillant that it does not love fresh food, and therefore leaves its prey on the gibbet till it becomes putrescent. But beneath the scorching sun of Africa this process of decomposition sometimes does not take place, from the rapid exhalation of the animal fluids in a warm and arid atmosphere; and, consequently, whatever spiny shrub may have been chosen by the butcher-bird as the place of execution, is frequently found covered, not with sweet-smelling and many-coloured blossoms, but with the dried carcases of singing birds, and the bodies of other large insects.

"On the opposite side of the Green Fish River," says Mr. Barrow, "was a clump of bushes, loaded with nests so large, that we thought they belonged either to the vultures that were hovering over them, or the blue cranes that sat by the side of the river. On approaching the bushes, a number of birds of the thrush kind flew out of them. These are called the locust-eaters; they appear only with the destructive insects on which they feed: and though their numbers are said to be no less astonishing than those of the locusts, they had here pitched upon a place where they were not likely to want provisions. For the breadth of ten miles on each side of the Sea-cow River, and the length of eighty or ninety miles, was literally covered with locusts in their incomplete state. Immense numbers had been drowned in attempting to reach the reeds, and lay in heaps by the brink. On examination, we found the nest of the locust-eater consisted of many cells, and that each cell was the habitation of a separate family, and had a tube on the side for its entrance."

There is a species of this bird to be found in our own country, for Mr. White of Selborne speaks thus of it:—

"The next bird I procured on the 21st of May, was a male red-backed butcher-bird (*lanius collurio*). My neighbour, who shot it, says that it might easily have escaped his notice, had not the outcries and chattering of the whitethroats and other small birds drawn his attention to the bush where it was; its craw was filled with the legs and wings of beetles, &c."

You have now read something of the habits and manners of these curious insects, and of those of their enemies; and I think, if not amused by them, you will have been at least surprised to think what a marvellous system these creatures carry on, though they have neither king nor leader; how dreadful and how mighty the devastations of some of their species; and how harmless, and even domesticated, are others. Travellers have roamed over the world to gain this information; and there is, doubtless, still much to be learned: nor will you, I think, agree with the Spanish lawyer, of whom Mr. Darwin relates the following anecdote:—"At Chili, one day, a German collector in natural history, of the name of Renons, called, and nearly at the same time an old Spanish lawyer. I was amused by afterwards hearing the conversation which took place between them. Renons speaks Spanish so well that the old lawyer mistook him for a fellow-countryman. Renons, alluding to myself, asked him what he thought of the king of England sending out a collector to their country to pick up lizards and beetles, and to break stones? The old gentleman thought seriously for some time, and then said, 'It is not well; haz un gato encerrado aqui (there is a cat shut up here). No man is so rich as to send out people to pick up such rubbish. I do not like it; if one of us were to go and do such things in England, do not you think the king of England would very soon send us out of his country?' And this old gentleman, from his profession, belongs to the better informed and more intelligent classes. Renons himself, two or three years before, left in a house at S. Fernando some caterpillars, under charge of a girl to feed, that they might turn into butterflies. This was rumoured through the town, and at last the padres and governor consulted together, and agreed it must be some sorcery. Accordingly, when Renons returned, he was arrested." It is fortunate for us that in this country people may pursue so innocent a study as that of animals and insects without dread of molestation; and if the question should be asked, Whether any useful result is likely to follow from such a pursuit, it must be acknowledged, that if the word *useful* is employed in its vulgar acceptation, as referring to the supply of our physical wants, I cannot tell, never having made the inquiry. But if the term *utility* is intended to comprise those higher advantages which are connected with the moral and intellectual influence of the employment itself,—its tendency to elevate, refine, and harmonize the character,—to exercise, without harassing, the faculties,—to divert the attention from mercenary and sensual objects to purer and nobler contemplations, to bring the mind within the tranquil precincts of the temple, whence it may readily, and often, and without violence, be called into the sanctuary,—if by this standard the value of our pursuits is to be measured, there are few of them, perhaps, that deserve to occupy a higher place than the study of nature.

"Although," says Mr. Murray, "some pseudo-philosophers have sneered at the littleness of the creatures thus contemplated, they show but their puny wit, and the feebleness of their own understanding. Apart, they may occasionally appear but 'feeble folk,' but with a commission from Jehovah, become as the armies of the living God. The contemptible molehills may drive man to madness, and *the terrible* zimb make the most savage beast of the desert tremble and flee before it. An army of locusts, denser than the storm-cloud, and compassing an extent of many miles, may lay waste, in a few short hours, the blossom and promise of the year, and mercilessly consign the myriad population of a vast empire to pestilence and famine, and all the "bitterness of death;" and, in its ravages, mock the devastations of Turks, Saracens, and Tartars, and claim mightier trophies and triumphs than an Attila, an Alexander, or a Genseric. Nay more, the great features of the terrestrial globe may be essentially changed by the humble zoophyte, or polype; and man, and all his proudest labours, are mocked by the architecture of a worm. Coral reefs and islands rise from the ocean's unfathomable bed. These stony trees soon accumulate into rocks and reefs, and finally, braving the surface of the deep, block up the entrance of harbours, and become destructive snares for the mariner. The waves of the sea rake up from their deepest abyss, sand and mud; and transporting sea-weed, finally to decompose, leave their treasures at this new isle of the ocean; while the atmosphere scatters from its bosom the embryos of vegetation, which its friendly breezes had borne from distant shores, and it soon becomes an emerald isle, blooming with the refreshing verdure of luxuriant vegetation. Thus is reared a theatre for some future warrior, poet, or philosopher, to "strut his little hour upon;" for man comes at length, and here plants the standard of his country, and claims it for his own.

The colour that vies with the brightest gem of the rainbow, we owe to an insect; the finest tissue, once balanced for its weight in gold, we receive from an insect; an island from another. What is sweeter than honey?—an insect prepares it. These are but a few of the benefits we receive from the insect tribe; but these exalt them in the scale of usefulness. Nor are the subjects of entomology without their value in the arts that are mechanical. James Watt received his idea of the structure of the joints of the flexible pipes across the Clyde from that in the tail of the lobster; which, though now removed to a new family, the *crustacea,* still maintains its former place in the system of some entomologists. We have too a peculiar spring, constructed on that of the *cicada,* or grasshopper.

By studying the natural history and economy of insects, we shall obtain more enlarged views of the beneficence and omnipotence of Heaven; and in their protection and preservation, admire that gracious Providence which watches over the minute as well as the vast and gigantic in the universe. It is not less delightful to contemplate the humble *colinia arenaria* guarding the confines of the sea, by interlacing and intertwisting the sod that enamels its shore, as if commissioned by Providence to say to its world of waters, "hitherto shalt thou go, and no further: and here shall thy proud waves be stayed:" than to contemplate "the moon walking in brightness" amid a thousand twinkling worlds of light. If *size* were the touchstone of excellence and standard of appeal, then, as has been well observed, would "the horse be more excellent than his rider;" but "good and excellent as are the feelings towards the Creator, which the study of nature is calculated to produce within us, we must not attach so much importance to them as may lead to the exclusion of other considerations of far higher and weightier moment. In other words, we must not mistake natural religion for revealed, nor suppose that the truths, which this last alone can teach us, are to be learned by the most attentive regard to this lower world, and its varied productions. This is a solemn reflection; and they who study the works of their Great Creator must take heed not to let the sense they thereby attain of His adorable perfections be the *whole* of their religion, nor a plea for neglecting the teaching of His revealed word. May we never forget, that *both* these come from the same Author; that man's welfare and interests are as much concerned and bound up in one as in the other; and that no feelings are to be trusted, which prompt us to make our *own* selection in respect of what is to be our rule of duty, or our guide to happiness.

An elegant writer says, in his interesting "Journal of a Naturalist:" "Perhaps none of the amusements of human life are more satisfactory and dignified, than the investigation and survey of the workings and ways of Providence in this created world of wonders, filled with His never-absent power: it occupies and elevates the mind, is inexhaustible in supply, and while it furnishes meditation for the closet of the studious, gives to the reflections of the moralizing rambler admiration and delight, and is an engaging companion that will communicate an interest to every rural walk. The minutest of His works being the formation of supreme intelligence, for a wise and worthy end, may lead us by gentle gradations to a faint conception of the powers of Infinite Wisdom."

And not only does the study of insects tend, in various ways, to the good of mankind, but it is also a subject of great interest and endless amusement to the mind. The habits and economy of each separate species differ so greatly, and each single species offers so much material for thought, that it has been said, were man's life even longer than it is, it would not be sufficient to attain a thorough knowledge of the peculiar mode of life of even one insect.

THE SPIDER taketh hold with her hands, and is in kings' palaces
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THE SPIDER.

It is not to be supposed, nor to be desired, that any of you, for whom this compilation is made, would wish to spend a lifetime in considering so ugly an animal as the spider; but it will lessen your dislike of them to "consider their ways" also; for though they be less amiable than others of the insect tribe, they are industrious, and generally, in our country, harmless to man. Naturalists own that they have still much to learn on the subject; but we shall gather a little from what they have already found out for your amusement.

The genus *aranea* includes a vast, if not endless variety of species, and though the greatest dissimilarity may be observed as to size, proportion, or colouring of many individual kinds, yet the rapaciousness common to the family is apparent in all. Our domestic spiders are plain in their colours, and seldom attain a very extraordinary size; our gardens are infested by species somewhat larger, and more lively in their marks and tints; but [illegible] we wish to trace the first gradations of the beauty, or size, of these creatures, the forests abound, and will afford the highest gratification to the inquiries of the naturalist.

We have spiders purely white, or white stained with a lovely green; yellow, marked with a vivid red; purple, shaded with the richest hues; and the richest browns, bespangled with the utmost elegance and symmetry. Yet, under these rich adornments, this complication of beauty and ferocity, we discover inherent qualities, which, in larger animals, would become formidable.

Spiders exhibit marked differences from the true *insecta*. Thus, the head is no longer distinctly separated from the thorax, and they have no antennæ; besides, they have four pair of legs with six joints, thickly beset with hairs, and terminating in two crooked, moveable claws, which have little teeth like a saw; at a small distance from these claws, but placed higher up, is another, somewhat like a cock's spurs, by the assistance of which it adheres to its web; but the weapon wherewith it seizes and kills its prey, is a pair of sharp crooked claws, or forceps. The claws themselves must have the sense of touch in perfection; for in making the various rays as well as the cross lines o[illegible] a geometric net, the spider always guides the thread *from* the spinneret by one of its hind claws, which i[illegible] cannot possibly see with any one of its eyes, as these are all placed forwards on the head. The exquisite workmanship of these webs, thus woven, as it were, in the dark, indicates that the sense of touch, by which alone it can be accomplished, must be peculiarly delicate.

In the family of the *phalangoidæ,* which have only two eyes, and do not spin webs, the long legs are used not only to escape from enemies and pursue prey, but to explore by touch the objects among which they travel. The long-legged house spider, *phocus phalangoides,* spins a loose irregular web in the corners of walls, but keeps its legs spread out, as if on purpose to feel more readily when anything is caught. Its sight and hearing seems to be still more acute than its touch, for its eyes are more than usually prominent and closely grouped, and the faintest hum of a gnat puts it on the alert. It requires no little agility to seize these, particularly the *chironomus motilator,* or vibratory gnat, which have been observed to be its chief prey, as the least noise or movement puts these gnats to flight. Hence it may be inferred, that the very long legs of this spider are intended more for pursuit than for feeling.

Their eyes are always simple, and usually consist of six or eight, disposed in a variety of ways on the top of the cephalo-thorax—the number and arrangement of which have greatly helped towards their systematic distribution. Two on the top of the head look directly upwards; two in the front, a little before the foregoing, to discover what passes before them; and on each side, a couple more; one whereof points sideways forward, the other sideways backwards, so that they can see almost all around them. They are immoveable; and seem to be of a hard, transparent, horny substance. Mr. Dupin says, with respect to the simple eyes, that they shine in darkness or dusk, like those of the cat; and that the *araneides* have probably the faculty of seeing both by day and night. The number of eyes differs in the several species of the spider. They have from four to twelve. In one genus (*hops.*) the species have only two eyes; but most of them are provided with six or eight.

Although possessing no evident and distinct organ of hearing, it cannot be doubted that they have a perception of sound, and touch is acutely performed by their extremely sensible tarsi and palpi. In a large division of them, the usual tracheal respiration of the hexapod *insecta* is transferred into a pulmonary apparatus; and in these there is a *complete* circulating system, which in the *insecta* has been always observed to be either partial or imperfect. Dr. Badham says, "At the joints of spiders' legs I have observed the circulation very distinct, the current of dark globules passing rapidly at each pulsation of the dorsal vessel." The respiratory apertures are usually four, placed near the spinnerets, towards the base of the abdomen.

Spiders shed their skins several times during growth. These exuviæ, or cast skins, being very transparent, afford excellent objects for microscopic examination of the exact forms of the parts to which they belonged; these always retain their original form.

The instincts of spiders are apparently very perfect, and even capable of striking development. They are very sanguinary in disposition, and consequently require the full exercise of these faculties to circumvent their prey, from the latter being instinctively apprehensive of their natural enemies. Although best known to ordinary observers from the nets spread forth by many for the purpose of intercepting their supplies of food, and by the elegant reticulation of this delicate filament, which is a glutinous silk, secreted in a liquid state within the body, and transuded through a cluster of small orifices at the apex of the abdomen, yet very many do not possess the means of weaving this web, whence the order has obtained its classical name; but they roam forth, or form pit-falls, and exercise their ingenuity in a variety of ways, to obtain their requisite supplies of provisions.

Spiders have been divided into the *pulmonary arachnidæ*, and the *tracheal arachidnæ*, the latter, of course, allied to the hexapod *insecta*, although hitherto the smaller division. The *pulmonary arachnidæ* are the most typical, and the most abundant; these are further divided into 1, *arachnidæ;* 2, *phryncidæ;* 3, the *scorpionidæ.* The *tracheal arachnidæ* comprise, 4, the *solphagidæ;* 5, *phalangidæ;* and 6, the *acaridæ.* Of the first, the *arachnidæ,* we have a further division, into terrestrial and aquatic. The former inhabit the earth, and are either suspended in the air or cavities in rocks, trees, or they are affixed to plants, or else they occupy holes in the ground; whereas the aquatic *araneidæ* dwell in the midst of the water, in a cell filled with air. The former are divided into *theraphores,* and *arachnæ* proper. In the *theraphores,* the mandibles are articulated horizontally, having a vertical motion; and in the *arachnæ* they are articulated either vertically or upon an inclined plane, and have a lateral motion. In the former group of *theraphores,* we find the large and powerful *mygale,* the most robust insects of the order.

The *arachnæ* may be divided into, first, those which are called *vagabonda,* which quit their dwellings to chase and catch their prey; secondly, the wanderers, which roam about in the vicinity of the nests they have constructed, or the nets they have spread to entangle their prey; and thirdly, those which are sedentary, which construct large nets for the apprehension of their prey, and in the centre or sides of which they lurk, awaiting it. Among the vagabonda are found some with six eyes, and others with eight. Those with six form either tubes or cells of silk, within which they dwell; and these constitute the genera *dysdera*, *segistera*, *uptiotes*, &c. The possession of eight eyes is however found the most prevalent peculiarity, being all but universal in this division. Among the vagabonda with eight eyes are the runners, which run with agility to catch their prey, including *lycosus*, *sphasus*, *etenus*, &c. The leapers, those which leap and jump lightly upon their prey, as *myrmica*, *gresus*, *eresus*, *attris*, or *saltens*, &c.; and the walkers, which walk laterally and backwards, and occasionally spread nets to supply themselves with provisions.

In the second division, or wanderers, we find (1,) the *niditiles*, which form a web of their nests, whither filaments converge, by which they catch their prey. They consist of *clubione*, *desis*, and *drassus*; (2,) the *filitiles*, which spread long filaments of silk wherever they move, to catch theirs; and here we find *clotho, engo, pholcus,* &c.; (3,) *tapiteles,* which manufacture large webs of a close tissue, and within which they reside, awaiting their prey; and here we have *tegenaria, lachesis,* &c.; (4,) the *orbiteles,* which construct webs with open meshes, and formed either in regular concentric circles, or in spires, and which lurk either in the centre, or at the side, awaiting the entanglement of their victims: here we have *epira, tetragnatha, zoris,* &c.; (5,) the *napiteles,* which spread wide nets of a web of close texture, suspended among irregular chambers; this, as far as yet observed, is confined to the genus *luryphia:* and (6) lastly, the *retitiles,* which form webs with open meshes, and irregular chambers, and which lurk in the centre, or at the sides. These comprise *argus* and *theridion,* &c.

The aquatic *araneidæ* consist of the single genus *argyroneter,* which spreads filaments in the water, which catch for them their food. It is in the genus *lycosus,* among the vagabonda, that the celebrated *tarantula* occurs.

The *phryneidæ,* or second division of the pulmonary *arachnidæ,* are distinguished from the first, by their anterior legs being not angulated, and very like antennæ, and possibly executing similar functions; and the maxillary palpi very spinose, and terminating either in hooks or chelæ. They consist of two genera, *thrynus* and *thalyphonus*. They are inhabitants of the intertropical regions of the old and new world. The latter is distinguished from the former by having a long and slender tail, and more robust maxillary palpi. Their habits are not known, but they are much feared in the countries where they occur; and they are of a malignant aspect, and comparatively large.

The scorpions form the third division. These are readily distinguished from all the former by their enlarged maxillary palpi, which here form a prehensile organ, greatly resembling, to use a familiar illustration, the claw of a lobster. They have an elongated annulated abdomen, with no deep constriction or separation between the thorax and abdomen; eight magniculated legs; and a tail of six joints, separated from each other by a deep strangulation, the last bearing a curved hook, whereby the insect inflicts a wound and injects a poison. These are terrific creatures, whose poison becomes the more virulent as they approach the torrid zone. None, fortunately, are natives of this country, but several occur in the South of Europe.

The *solpugidæ*, the first division of the tracheal *arachnidæ*, are equally hideous with the last in aspect —being usually covered with long hairs or spines, and are said to be also venomous; but if so, the poison must be injected by the mandibles. They have the head, thorax, and abdomen, separated by a strangulation. They have eight legs—the anterior pair being palpiform, as are also their maxillæ; whilst their mandibles form robust didactyle claws; and their abdomen consists of a succession of segments. They frequent hot countries, and sandy districts, especially of the old world. They run with great rapidity, holding up their heads as if to defend themselves. With these doubtlessly, *chelifer* and *obisium* may be united; which are minute animals, both natives of our own country, but perhaps the most eccentric forms among them are found in *gonoleptes* and its affinities, from the Brazils. They usually occur running upon the ground or on plants, and are very active; some also are found under stones, or in moss.

The last tribe of the *arachnidæ* are the *acaridæ,* or mites. Head, thorax, and abdomen are here usually united; their abdomen is not divided into segments; they have eight legs; and their mouth is haustellate, or consisting of pieces, which form a sucking tube. These comprise an extensive tribe of creatures, which are excessively prolific, consisting also of many genera, as *trombidium, gamosus, hodes, bdella,* &c. The majority are very small, and occur everywhere, beneath stones, in moss, under the barks of trees; in flour, dried provisions, old cheese, &c.; others live as parasites upon the skin, or in the flesh of animals; and some are said to be the cause of some loathsome diseases which affect humanity—the itch for instance. They are found upon other insects; and some have even been observed in the eyes and brain of man."

The *arachnidæ* are true earth-dwellers; but some true spiders seek the air as their medium, for they distend their web upon elevated sunny places, and, floating in it, seem to endeavour to revel in the purer air; and, indeed, a few raise themselves upwards in the air: for instance, *a. obtectrix*, which is raised by the wind upon its self-formed clouds, and swims in the fluid element. The majority are inimical to water; a few only seek it, and dwell in it.

Pliny's remarks on this curious and ingenious insect are worth recording. "Mark, I pray you," says he, "how artificially she hides the snares in that net of hers, made into squares, to catch the bonflies. A man would not think, who sees the long yarne in her web wrought sieve-wise, smoothed and polished so cunningly, and the very manner of the woofe so glueish and clammie as it is of itselfe, that all were to any purpose, and served for that which she intends. See, withall, how sleek and hollow the net is made to abide the wind, for feare of breaking, and thereby so much the better also to fold and enwrap whatsoever comes within her reach! What a craft is this of hers to leave the upper part thereof in the front undone, as if she were wearie (for so a man may guesse, when he can hardly see the reason), and (as it is in hunters' net and toile) that so soon as those nets be stumbled upon, they should cast the flies headlong into the lap and concentre of the net? To come now unto her nest and hole:—Is there any architecture comparable to the vault and arched frame? and, for to keep out the cold, how is it wrought with a longer and deeper nap than the rest? What subtiltie is this of hers to retire into a corner so far from the midst, making semblance as though she meant nothing lesse than that she doth, and as if she went about some other businesse! Nay, how close lies she, that it is impossible for one to see whether any bodie be within or no! What should I speak of the strength that this web hath to resist the puffes and blasts of winds; of the roughnesse to hold and not breake, notwithstanding a deale of dust doth weigh and beare it down? Many a time ye shall see a broad web, reaching from one tree to another; and this is when she learns to weave, and begins to practice and try her skill . . . . . . Looke what is slit or rent in her net, she presently doth mend and repair; and that so even and small, that a man cannot see where the hole was darned and drawn up again. These spiders hunt also after the young lizards: first, they enfold and wrap the head within their web; then they catch hold and tweake both their lips together, and so bite and pinch them,—a worthy sight and spectacle to behold, fit for a king, even from the stately amphitheatres, when such a combat chances."

Naturalists assert, that animals and birds, as well as "knotted oaks," as Congreve informs us, are sensible to the charms of music. This may serve as an instance: "An officer was confined in the Bastille; he begged the governor to permit him the use of his lute, to soften, by the harmonies of his instrument, the rigours of his prison. At the end of a few days, this modern Orpheus, playing on his lute, was greatly astonished to see frisking out of their holes great numbers of mice; and, descending from their woven habitations, crowds of spiders, who formed a circle about him, while he continued breathing his soul-subduing instrument. Having ceased to play, the assembly immediately broke up. At length, having overcome, for the novelty of his company, his dislike of them, he recommenced his concert, when the assembly was by far more numerous than at first; and in the course of farther time, he found himself surrounded by a hundred musical amateurs. (The rest of the story is too disagreeable to relate.)—*J. K.*

The Abbé Olivet has described an amusement of Pelisson, during his confinement in the Bastille, which consisted in feeding a spider which he had discovered forming its web in the corner of the small window. For some time he placed his flies at the edge, while his valet, who was with him, played on a bagpipe; little by little, the spider used itself to distinguish the sound of the instrument, and issued from its hole to run and catch its prey. Thus calling it always by the same sound, and placing the flies at a still greater distance, he succeeded, after several months, to drill the spider by regular exercise, so that at length it never failed appearing at the first sound to seize the fly provided for it, even on the knees of the prisoner.

Mr. Murray says, "Spiders have an ear attuned to the 'concord of sweet sounds.' Hence, in the church or the concert room, they are sure to let themselves fall from the ceiling by lengthened threads; and if a flageolet be played, spiders will hang motionless, having let themselves down not far from the spot where the instrument is played; in this way have those spiders perhaps been tamed that have become the only companions of the solitary in his cell or dungeon."

Even the tight-drawn spider's thread may, when struck by the passing wind, emit an Æolian note, audible to a spider's ear.

From spiders being destitute of antennæ, it is thought very difficult to conceive where the seat of their organ of smell is placed, if indeed they possess one, which seems doubtful.

It is well known that all spiders are essentially night insects, though we might imagine they would be more successful in their captures during the day, when more insects are abroad, and on the alert. It would not, indeed, be then so easy to secure a fly, when animated with the enlivening influence of the sunshine; and the web would stand the chance of more frequent and extensive breaches. But be the causes what they may, spiders most usually hunt in the night; and only during cloudy weather in the day; for it is rare to see one making or mending a web during bright sunshine. Whether this singularity arises from the effect produced by moist air on their organs of touch, or whether it arises from the diminution of light upon their eyes, has not been ascertained.

Some species of *theridion* remain under stones. In these situations, in Jamaica, is found (says Mr. Gosse,) a little spider with round glossy abdomen, black, with three scarlet spots near the extremity (probably a *theridium*). This is held in great terror, as highly venomous. About this time (April) I find them carrying yellow membraneous egg-bags, globular, thin, and empty. When uncovered, they are unwilling to run, keeping close to the under surface of the stone that has served them for shelter and concealment. Others inhabit the parts of houses which are little frequented, or seldom visited, and make their webs either at the angles of walls, or in closets, and amongst furniture; but most part of the others choose as a domicile trees or flowers.

This species, called by Walckenaar *benignum,* is frequently seen, especially in autumn, in gardens and kitchen-gardens. Its irregular web, notwithstanding its extreme tenuity, often protects grapes from the bite of insects. It is seldom that this fruit is used without finding the animal there. It is also fond of spreading its threads over the surface of the leaves, between the flowers, and at the extremity of different vegetables.

The two sexes live together in tranquillity, forming, in this respect, a rare exception to the spider race. This good understanding appears to be general among all the *theridia*.

Of all the known *theridia*, the species most deserving attention is that which Rossi calls *guttata*, and which is the spider well known in the island of Cornia, under the name *tharmiquetto*, or *tharmaquato*. According to him, its bite is mortal, even to man himself. It produces the most serious symptoms, which scarcely disappear by the operation of sudorifics and scarifications. This animal spreads along the furrows of the fields different threads, so as to stop or impede the progress of locusts, of which it makes its prey. Having the body reversed, and suspended by the fore-feet, it draws, by the help of the hinder feet, some new threads, which it shoots very quick, and by an undulatory movement, on the feet of the locust, until it has sufficiently entangled it, to approach without any fear. It first bites it near the neck, and then sucks it at its leisure, as the animal, on being bitten, falls into convulsions immediately, and perishes. If enclosed in a vessel with a locust, the *theridion*, by trying to envelope it, soon exhausts all its silky matter, and dies itself, having lost all its strength. It will not attack the European scorpion, or different spiders which may share its captivity; but it is not so with individuals of its own species, with which it fights to the death. It has been observed that where this *theridion* is most common, a hymenopterous insect, known by the trivial name of St. John's fly, in all probability a sphex or pompilus, destroys a great number of them. The cocoon is about the size of a hazel-nut, and the mother guards it with the greatest assiduity.

De Geer has observed another *theridion* spin round the insect arrested in its snare, as well as all round the neighbourhood, fresh threads, drawing them with its hinder feet, so as to hinder its prey from breaking its fetters, and then attack it with open force, kill it, and drag it within its domicile: this is usually in the cleft of a casement. The angles, the corners of the walls which are near it, are curtained with its web, which is loose and spreading.

The species of the genus *linyphia*, the most common *triangularis*, spins on bushes, &c., particularly toward the end of summer, a horizontal web, hung between the branches; slender, not compact, and the extent of which, often considerable, varies in proportion to its proximity to, or distance from, the points of attachment. To maintain it in the same situation, and prevent its sinking, it spreads above, and on all sides, perpendicular and oblique threads, which it fixes to the branches in the neighbourhood. They are sometimes even so drawn, that the web becomes convex. It is suspended in the midst of this very irregular assemblage of threads, being directed and crossing on all sides. The animal remains in an inverted position, having the belly upwards, and usually at the centre of the web. As soon as an insect is caught there, it runs out quickly, pierces it with its mandibles through the web, makes a rent there to allow it to pass, and without enveloping it in silk, sucks the insect which is dead, or excessively enfeebled by the effects of the poison. When many individuals of this species are placed together, they slaughter each other without mercy.

The eggs of these creatures are of a reddish brown. Their usual colour is blackish. Mr. Milbert has discovered in the environs of Philadelphia another of this species, entirely black, with the feet fawn-coloured.

When a spider catches a fly, if he be small, she kills him at once, if he be too large to attack openly, she envelopes him in her net; but if he be so large as to risk injuring the net, and his escape is inevitable, she detaches the cords by which he is held, and helps him to get away.

Evelyn gives the following account of the intelligence of a Roman spider, which, espying a fly at three or four yards' distance,* upon the balcony where he stood, would not make directly to him, but crawled under the rail, till, being arrived at his antipodes, it would steal up, seldom missing its aim; but if it chanced to want anything of being perfectly opposite, it would at first peep, and immediately slide down again, till, taking better notice, it would come the next time exactly upon the fly's back. But, if this happened not to be within a competent leap, then would the insect move so softly, as the very shadow of the gnomon seemed not to be more imperceptible, unless the fly moved, and then would the spider move also in the same proportion, keeping that just time with her motion, as if the same soul animated both their little bodies; and, whether it went forwards or backwards, or to either side, without at all turning her body, like a well-managed horse; but if the capricious fly took wing, and pitched upon another place, behind her huntress, then would the spider whirl its body so nimbly about, as nothing could be imagined more swift, by which means she always kept her head towards her prey, though to appearance as immoveable as though it had been a nail driven into the wood, till, by that indiscernible progress having arrived within the sphere of her reach, she made a fatal leap, swift as lightning, upon the fly, catching him in the poll, where she never quitted hold till her belly was full, and then carried the remainder home.

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* It is only *closely* that spiders can see *accurately*: at a distance the object appears to vanish from them.

Many sorts of spiders eagerly seek out bee-houses, where, if they are not prevented, they extend their nets and cause the death and destruction of many of the bees, as we frequently see in neglected bee-houses, where their possessors only attend to them when their object is to get something from them. Spiders do not venture into the interior of the hive: they never dispute with a bee on the outside of their net, well knowing that they would be worsted; but if a bee gets into their net, they spin it up as they do other insects, and suck its juices. Their nets should, therefore, be carefully destroyed, all the year through, and the best plan of all is, they should be searched for in their hiding-places, where they lie concealed, and killed. They will generally be found in a corner or crevice of the woodwork of the bee-house.

Among some of the unamiable features of this species of insect, we must note its avidity and greediness. It is stated that the sexton of the church of St. Eustace, at Paris, was surprised at often discovering a certain lamp extinct in the morning. The oil appeared to be always regularly consumed. He sat up several nights, in order to discover the cause of its mysterious disappearance, and at last perceived a spider of enormous dimensions descend the chain or cord, and drink up all the oil. A spider of vast size was also seen in the year 1751 in the cathedral of Milan. It was observed to feed on the oil of the lamp. When killed, it weighed four pounds! and was afterwards sent to the Imperial Museum at Vienna.

Upon the banks of the Amazon, spiders, which are solitary in Europe and Asia, live in congregated societies of several thousands. Taking possession of a tree, they unite in forming a net entirely over it. When this net is completed, they take their separate stations; each secures its own prey without disturbance; each labours for itself; but in case of damage to their net, they labour to repair it for the general good.

I think you will be pleased to hear of their cleanliness and orderly habits. The process of cleaning and brushing the legs, as birds are seen to plume their feathers, is very remarkable, though perhaps seldom taken notice of. The same process is employed by the *phalangia*. The apparatus for this is admirably contrived. In the common garden geometric spider (*epeira diadema)* the teeth are used as a comb, the smooth mandible being employed to hold down the limb, while it is slowly drawn between the teeth, to free it from flue and dust. In some other species, instead of smooth teeth, there is a thickset brush of hairs, which is used in the same manner, and must be a still more efficient instrument. The former, if we do not mistake, chiefly occurs among the geometric spiders, whose webs are meshed and thin; while the brush prevails among those which weave thick webs, such as the red spider *(dysdera erythrina)*, which was found in the crevice of a chalk rock, near Erith in Kent, but which is by no means common in Britain, though abundant in France. This one was kept for some time in a glass, and it was observed that it spent the greater part of its time in brushing its legs. The eyes are placed in form of a horse-shoe.

Doubtless many of you will recollect the interesting anecdote told by Sir Walter Scott, in his "Tales of a Grandfather;" but for those who may not, or who may still have before them the enviable pleasure of reading this delightful book, we shall transcribe the anecdote.

"Bruce was residing in a miserable dwelling at Rachrin, when the news of the taking of Kildrummie, the captivity of his wife, and the execution of his brother, reached him, and reduced him to the point of despair. It was about this time that an incident took place, which, although it rests only on tradition in families of the name of Bruce, is rendered probable by the manners of the time. After receiving the last unpleasing intelligence from Scotland, Bruce was lying one morning on his wretched bed, and deliberating with himself whether he had not better resign all thoughts of again attempting to make good his right to the Scottish crown, and, dismissing his followers, transport himself and his brothers to the Holy Land, and spend the rest of his life in fighting against the Saracens; by which he thought, perhaps, he might deserve the forgiveness of Heaven for the great sin of stabbing Comyn in the church at Dumfries. But then, on the other hand, he thought it would be both criminal and cowardly to give up his attempts to restore freedom to Scotland, while there yet remained the least chance of his being successful in an undertaking, which, rightly considered, was much more his duty than to drive the infidels out of Palestine, though the superstition of his age might think otherwise. While he was divided betwixt these reflections, and doubtful of what he should do, Bruce was looking upward to the roof of the cabin in which he lay; and his eye was attracted by a spider, which, hanging at the end of a long thread of its own spinning, was endeavouring, as is the fashion of that creature, to swing itself from one beam in the roof to another, for the purpose of fixing the line on which it meant to stretch its web. The insect made the attempt again and again without success; and at length Bruce counted that it had tried to carry its point six times, and been as often unable to do so. It came into his head that he had himself fought just six battles against the English and their allies, and that the poor persevering spider was exactly in the same situation with himself, having made as many trials, and been as often disappointed in what it aimed at. Now, thought Bruce, as I have no means of knowing what is best to be done, I will be guided by the luck which shall attend this spider. If the insect shall make another effort to fix its thread, and shall be successful, I will venture a seventh time to try my fortune in Scotland; but if the spider shall fail, I will go to the wars in Palestine, and never more return to my native country.

"While Bruce was forming this resolution, the spider made another exertion with all the force it could muster, and fairly succeeded in fastening its thread to the beam which it had so often in vain attempted to reach. Bruce, seeing the success of the spider, resolved to try his own fortune; and as he had never before gained a victory, so he never afterwards sustained any considerable or decisive check or defeat. I have often met with people of the name of Bruce so completely persuaded of the truth of this story, that they would not on any account kill a spider; because it was that insect which had shown the example of perseverance, and given a signal of good luck to their great name-sake."

M. D'Isjonval believed some spiders to be *certain* indicators of weather. The following are the species named by him as being such :—

The *scanica,* found on roofs, and does not make a web. It may be often seen in this country, running on the walls in summer.

The *lycosa succata*—see p. 339.

The *avicularia*—see p. 392.

The *spithaman* in the East Indies. When the legs are extended, it covers the space of a hand; and

The *tarantula* of Apulia.

It is related of the said M. Quatremère d' Isjonval, who was a state prisoner in Holland in the latter part of 1794, when the French army, under Pichegru, invaded that country, that he found means to carry on a correspondence with the French general; and having carefully watched the operations of his spiders, he wrote to Pichegru, to inform him where he was, and that from his observations on spiders, he knew a severe winter was at hand, which would of course facilitate the operations of the invading army. The French general, who had already thought of retreating, acted upon the hint, and a few days afterwards, took possession of the whole country; which would have been inaccessible to him had it not been for the ice, which was soon sufficiently strong to allow the French army to cross the river.

Spiders form an article in Spaerman's list of the Booshiesmans dainties, and Labillardière asserts, that the inhabitants of New Caledonia seek for and devour large quantities of a spider nearly an inch long, which they roast over a fire. Reaumur relates, that a young lady could never resist the temptation of eating a spider whenever she met with one in her walks. They are said to taste like nuts. The astronomer Lalande is said to have been equally fond of this offensive morsel.

They are imitated in this taste by the Titi of the Oroonoko (a species of monkey) which Humboldt tells us is particularly fond of spiders.

The learned do not seem to be at all agreed as to the spider being the animal intended in our text. You may hear what one of them, the Rev. Dr. Paxton, says: "The greater part of modern interpreters, among whom are to be numbered our own translators, imagine that the spider is intended in these words, 'The spider taketh hold with her hands; and is in king's palaces.' But a different word from the common Hebrew name of that insect is here employed; and a description subjoined, which, in one particular, is by no means applicable to it; for although several ancient writers have given fingers to the spider, not one hath honoured her with hands. An ancient poet, quoted by Bochart, has accordingly taught her to say,

> "'Mille mihi manus est, pedibus tamen omnia fiunt.'

Had the spider been intended, it would not have been merely said, she taketh hold with her hands; but she spins her thread, and weaves her toils; circumstances assuredly much more worthy of notice; nor would it have been said, that she takes up her abode in kings' palaces, when she more frequently constructs her house in the cabins of the poor, where she dwells in greater security and freedom.

The opinion of the celebrated Bochart, our principal guide in sacred zoology, that the *newt,* a species of small lizard, is meant, seems in every respect entitled to the preference. This venomous reptile answers to the description which the sacred author gives of her form and habits. Nature has furnished it with hands, and taught it to aspire to the superior accommodation which the palace of an eastern monarch affords.—So says the learned Dr. Paxton. But since some scholars hold a different opinion—since our early acquaintance with the Book of Proverbs is with the translation, we plead for our spider; and can testify to its being at least as ambitious as the newt, since both at home and abroad, we have met with it in palaces.

We shall begin, then, with the *aranea domestica,* or house-spider. It is called so from being very common in houses, and particularly about windows. The abdomen is nearly oval, of a brown colour; and marked with five black, and almost contiguous spots. House spiders feed principally upon flies; and the web by which they are enabled to entangle these insects, is a surprising part of the animal economy. For the purpose of forming this web, they are supplied with a quantity of glutinous matter, contained in a receptacle near the extremity of their bodies; and they have five teats for spinning it into thread, the orifices of which the insects have the power of contracting and dilating at pleasure. When they enter on the construction of this curious fabric, they fix on a spot of apparent plunder and security. The animal then distils one little drop of glutinous liquor, which is very tenacious; and, creeping along the wall, and joining its thread as it proceeds, darts itself to the opposite side, where the other end is to be fastened. The first thread thus formed, being drawn tight, and fixed at each end, the spider runs on it backwards and forwards, still doubling and strengthening it, as on this depends the stability of the whole. The scaffolding thus completed, it makes a number of threads parallel to the first, and then crosses them with others, the clammy substance of which they are formed, serving, when first made, to bind them to each other. At the bottom of the web a kind of funnel is constructed, in which the little creature lies concealed. In this den of destruction, it watches, with unremitted assiduity, till its prey is entangled, on which it instantly darts with inevitable ruin.

The web of the spiders differs from those woven by any human artist, in this circumstance, that, in our work, the threads extended in length are interlaced with those that are carried on transversely; whereas, the threads of a spider's woof only cross the threads of the warp, and are glued to them in the points where they mutually touch, and are not either inserted or interwoven.

The threads along the border of the work are doubled or trebled, by the spider's opening all her teats at once, and glueing several threads one over another; sensible that the extremity of the web ought to be hemmed and fortified to preserve it from being torn, she likewise farther secures and supports it with strong loops, or double threads, which she fixes all around it, and which hinder it from being the sport of the winds.

From time to time she finds it necessary to clear away the dust, which would otherwise incommode her web, and she sweeps the whole by giving it a shake with her paw; but, in doing this, she so nicely proportions the force of the blow to the strength of the work, that nothing is ever broken.

From all parts of the web are drawn several threads, which terminate like rays in a centre at the place of her concealment. The vibration of any of these threads is communicated to her, and gives her notice whenever there is game in the net; and, accordingly, she springs upon it in an instant. She derives another advantage from this retreat under her web, and that is the opportunity it affords of feasting on her prey in full security; and besides this, it gives her the power of concealing the carcases, and not leaving in the purlieus any traces of her barbarity capable of intimating the place of her resort, and inspiring other insects with the dread of approaching it.

This spider is furnished with a pair of very sharp hooked fangs, inclosed, when at rest, in the fore-part of his head: with this weapon, which a good glass will discover to have a small slit or orifice in each point, he seizes and pierces such insects as entangle themselves in his web; and by infusing a poisonous liquid into the wound. This poison must be very active and deleterious; for flies, and many other insects, may be mutilated by depriving them of their legs, wings, and even cutting their bodies through the very middle of the abdomen, and in that condition will survive several days; but this liquid, in a moment, kills them.

When two spiders of the same size meet in combat, neither of them will yield; they hold each other by their fangs so fast, that one of the two must die before they are separated. M. Leuwenhoeck says, "He saw one spider, that was however only wounded in the leg by his antagonist. A drop of blood, as large as a grain of sand, issued from the sore; and, not being able to use this wounded leg in running away from his enemy, he held it up, and presently afterwards the whole limb dropped from his body. When spiders are wounded in the breast, or upper parts of their body, they always die."

The spider, the *ptinus*, and many insects of the beetle kind, exhibit an instinct of a very extraordinary nature. When put in terror by a touch of the finger, the spider runs off with great swiftness; but if he finds that whatever direction he takes he is opposed by another finger, he then seems to despair of being able to escape, contracts his limbs and body, lies perfectly motionless, and counterfeits every symptom of death. "In this situation," says Mr. Smellie, "I have pierced spiders with pins, and torn them to pieces, without their discovering the smallest marks of pain. This simulation of death has been ascribed to a strong convulsion, or stupor, occasioned by terror; but this solution of the phenomenon," says Mr. Smellie, "is erroneous. I have repeatedly tried the experiment, and uniformly found that, if the object of terror be removed, in a few seconds the animal runs off with great rapidity." Mr. Gosse says:—"That curious flattened *arachnidon,* that looks like a scorpion without atail (*phrynus reniformis*), with the second pair of feet so produced and attenuated, as to resemble lengthened threads, is not uncommon beneath stones in the vicinity of Blue-fields, Jamaica. It appears inert when exposed, and perhaps hopes to escape. When this animal changes its skin, an opening may be seen, if carefully watched, in the belly. Through this, it draws all its limbs, and leaves the cold covering hanging to the cord that sustained it during the operation. The eyes of spiders are generally placed on the upper part of the head, but in various positions. They have no muscles belonging to them, and they are therefore altogether immoveable. They also consist only of one lens each, and do not, as in other insects, possess the faculty of multiplying objects; but their number and situation enable the animals to see perfectly well in all necessary directions.

The *aranea diadema,* or garden spider.—The labour of the garden spider is very different from that of the former species, yet it is not performed with less art. When desirous of flitting from one place to another, this animal fixes one end of a thread to the place where she stands, and then, with her hind-paws, draws out several other threads from the nipples, which, being lengthened out, and driven by the wind to some neighbouring tree or other object, are by their natural clamminess fixed to it. When she finds that these are fastened, she makes of them a bridge on which she can pass or re-pass at pleasure. This done, she renders the thread still thicker, by spinning others to it. From this thread she often descends by spinning downward to the ground. The thread formed by the latter operation she fixes to some stone, plant, or other substance. She reascends to the first thread, and at a little distance from the second begins a third, which she fixes in the same manner. She now strengthens all the three threads, and, beginning at one of the corners, weaves across, and at last forms a strong and durable net; in the centre of which she places herself with her head downward, to wait for her prey.

From having frequently remarked that spiders spread their webs in solitary and confined places, to which it is sometimes difficult for flies to penetrate, M. le Vaillant naturally concluded that these creatures must frequently remain long without food, and that consequently they were capable of enduring considerable abstinence. To ascertain the truth of this circumstance, he took a large garden spider, whose belly was about the size of a nut, and enclosed it under a glass bell, which he secured with cement round its bottom, and left in this situation for ten months. Notwithstanding this deprivation of food, it appeared during the whole time equally vigorous and alert, but its belly decreased, till at last it was scarcely larger than the head of a pin. He then put under the bell to it another spider of the same species. For a little while they kept at a respectful distance from each other, and remained motionless; but presently the meagre one, pressed by hunger, approached and attacked the stranger. It returned several times to the charge, and in these different conflicts its enemy became deprived of almost all its claws; it carried them away, and retired to its former situation to devour them. The meagre one had likewise lost three of its own claws, on which also it fed; and M. le Vaillant perceived that by this repast its plumpness was in some measure restored. The day following, the new comer, deprived of all its means of defence, fell a complete sacrifice. It was speedily devoured, and in less than twenty-four hours, the old inhabitant of the bell became as plump as it was at the first moment of its confinement.

Donovan gives a somewhat similar account. He says, "In February, we took a nest of minute yellowish eggs, which proved to be the infant offspring of the *aranea diadema.* When hatched, they scarcely exceeded the size of a pin's head, and were of a bright yellow colour. At first, their food was the common house-fly; but their increase in bulk was so rapid, that it was necessary to destroy many to preserve a few; we therefore selected four specimens, which, being fed in separate glasses, and on different insects, exhibited each a distinct degree of strength and colour. One specimen destroyed thirty of the common house-fly in one day; it then appeared much enlarged, and the colours were almost black, except the spots of white, which sparkled with infinite lustre; but being confined a week without a fresh supply, its colours were considerably faded; another week of abstinence reduced its colours to a pale uniform brown, the body was much wasted, and the creature became perfectly ravenous. It devoured a vast quantity of food, and recovered much of its former colours a few hours after. The circumstance of these creatures altering so much in appearance, according to the nature or quantity of nourishment they get, may account for the observation made by one of our best naturalists, *i. e.*, that this common spider of our gardens is so varied, that scarcely two individuals, even of the same brood, are found alike; varying in shade from silver grey to deep chocolate brown, and from pale yellow to brick red.

Mr. Murray says he has held the *aranea diadema* under water for a considerable time; and it not only seemed to suffer nothing from its submersion, but, on the contrary, set about deliberately weaving its web.

From the bags, in which the young of the garden spider are produced, an attempt has been made to manufacture a kind of silk, which has in some degree proved successful. With some troublé, thirteen ounces of these bags were collected. They were beaten for some time with a stick to free them from dust, and then washed in warm water till they were perfectly clean. After this, they were steeped in a pot with soap, nitre, and gum arabic, and then boiled in the same mixture over a gentle fire, for two or three hours. Clean warm water was again used to free them from the soap, &c.; and after having been laid for some days to dry, they were loosened with the fingers, previously to being carded by the common silk-carders. A beautiful ash-coloured silk was thus obtained, easy to be spun, and much stronger in the thread than that of the silk-worm. This was woven in the stocking-weavers' loom; and there could be no doubt but it would bear any any other loom. The thirteen ounces of bags yielded near four ounces of silk, three of which made a pair of stockings large enough for a man. It would be a difficult task to obtain bags sufficient to render the manufacture of the silk of any importance; since to obtain one pound of silk, 28,000 bags would be wanted; and for this quantity a greater number of spiders than this must be had, since none but the females spin them. But a still greater difficulty arises from their carnivorous disposition in devouring each other. Had this not been the case, a very nutritious food might have been adopted for them, in the soft substance of fresh quills.

If the silk had answered, we should have had from the different species of spiders, several genuine colours in silk; such as grey, white, sky-blue, and coffee-colour; whereas silk-worms yield only white and orange-colour.

Their silk is remarkable for its lightness and extreme tenuity.

The webs of *aranea domestica,* or house spider, already described, present merely a simple horizontal surface, but others more frequently seen in out-houses and amongst bushes possess a very artificial appendage. Besides the main web, the spider carries up from its edges and surface a number of single threads, often to the height of many feet, joining and crossing each other in various directions. Across these lines, which may be compared to the tackling of a ship, and which from their fineness are probably invisible to an insect's eye, flies cannot avoid directing their flight. The certain consequence is, that in striking against these ropes, they become slightly entangled, and in their endeavours to disengage themselves, rarely escape being precipitated into the web spread underneath for their reception, where their doom is inevitable. But it is necessary that our hunter should conceal its grim visage from the game for which it lies in wait. Concealed, therefore, in a silken apartment constructed below the net, it has taken care to spin several threads from the edge of the net to that of its hole, which at once inform it, by their vibrations, of the capture of a fly, and serve as a bridge on which in an instant it can be secured.

The geometrical spiders, in forming their concentric circled nets, follow a process very different and still more curious. As the net is usually fixed in a perpendicular or somewhat oblique direction, in an opening between the leaves of some shrub or plant, it is obvious that round its whole extent will be required lines to which can be attached those ends of the *radii* that are farthest from the centre. Accordingly, the construction of these exterior lines is the spider's first observation. She seems careless about the shape of the area which they enclose, well aware that she can as readily inscribe a circle in a triangle, as in a square; and in this respect she is guided by the distance or proximity of the points to which they can be attached. She spares no pains, however, to strengthen and keep them in a proper degree of tension. With the former view, she composes each line of five or six or even more threads glued together; and with the latter, she fixes to them, from different points, a numerous and intricate apparatus of smaller threads. Having thus completed the foundations of her snare, she proceeds to fill up the outline. Attaching a thread to one of the main lines, she walks along it, guiding it with one of her hind-feet, that it may not touch in any part, and be prematurely glued, and crosses over to the opposite side, where, by applying her spinners, she firmly fixes it. To the middle of this diagonal thread, which is to form the centre of her net, she fixes a second, which, in like manner, she conveys and fastens to another part of the lines encircling the area. Her work now proceeds rapidly. During the preliminary operations, she sometimes rests, as though her plan required meditation. But no sooner are the marginal lines of her net firmly stretched, and two or three radii spun from its centre, than she continues her labour so quickly and unremittingly, that the eye can scarcely follow her progress. She then proceeds to the centre, quickly turns herself round, and pulls each thread with her feet, to ascertain its strength, breaking any one that seems defective, and replacing it by another. Next, she glues immediately round the centre five or six small concentric circles, distant about half a line from each other, and then four or five larger ones, each separated by a space of half an inch or more. These last serve as a sort of temporary scaffolding to walk over, and to keep the radii properly stretched, while she glues to them the concentric circles that are to remain, which she now proceeds to construct. Placing herself at the circumference, and fastening her thread to the end of one of the radii, she walks up that one towards the centre, to such a distance as to draw the thread from her body of a sufficient length to reach to the next. Then stepping across, and conducting the thread with one of her hind-feet, she glues it with her spinners to the point in the adjoining radius to which it is to be fixed. This process she repeats, until she has filled up nearly the whole space from the circumference to the centre with concentric circles, distant from each other about two lines. She always, however, leaves a vacant interval around the smallest first-spun circles that are nearest to the centre: but, for what end, it is not easy to conjecture. Lastly, she runs to the centre, and bites away the small cotton-like tufts that united all the radii, which, being now held together by the circular threads, have thus probably their elasticity increased; and in this circular opening, resulting from this procedure, she takes her station and watches for her prey.

Mr. Murray observes on this: "It is interesting to note how well the *tibia* and *tarsus* supply the place of hands. The spider having collected the threads, emerging from the centre, retires to his hiding-place in one of the angles, and holding these threads by its *tibia* and *tarsus,* as a coachman managing his reins, is thus informed, by the vibration communicated, whenever an unfortunate and unwary insect is entangled. The particular thread of the web is thus easily discriminated, and though the spider may be so effectually concealed, as to be invisible to the victim, and the victim to it, it will pounce instantly on it, glancing along this single line. Sometimes the web of the *aranea geometrica* is somewhat in the form of a parallelogram, woven in the form of isosceles and scalene triangles."

One of the most beautiful displays of dew is that on the web of a spider; and, perhaps, that of the *eperia diadema,* sceptre spider, which is a large mottled garden insect, is one of the best, as the web is large and strong, and the rainbow-tints of the web are seen along with the glitter of the dew-drops, if the proper light is chosen—and any one may catch it by moving from side to side a little. At a more advanced period of the season, the drops freeze, and the main braces of the web may be taken by the ends, and examined like little strings of seed pearls. The spider is not on the web in the dew, and it is dead, or in its winter retirement, before the frost.

Before the heavy dews of late autumn set in, the spiders have all vanished from the gardens, but their webs remain for a considerable time after; and if the frosts are constant, they may be observed for a great part of the season, not only gemmed with the little pearl-drops of ice, but absolutely bristled with hoar frost. The quantity of these webs, in the gardens and fields, is immense; and it would be a curious inquiry to ascertain what purposes the wrecks serve in the economy of nature, as it is part of the economy of nature that no portion even of the refuse of her works is lost.

The most durable of these webs is that of the great garden spider. It has the complete structure of a regularly woven net upon it. It requires a magnifying power of 400 to 500 diameters to penetrate its substance. When a thread of its web is examined under the microscope, by stretching a short length across a bent wire, it is found to consist of a straight and strong line, upon which is attached a white and curved line; and the whole is surrounded by a broad blueish band. "There can be no doubt," says Dr. Badham, "this band consists of lines produced by the spider, and woven into the delicate tissue we have all so often admired."

The females lay six or seven hundred eggs in the same bag. This is generally done in August or September; and about sixteen days afterwards, the young are hatched. If the weather continue cold, the young remain in their nidus for several months, without eating or increasing in bulk; but make their appearance abroad on the commencement of the warm weather. The old ones live but a short time after the eggs are laid.

Birds are very fond of the egg-bags of spiders, and of the young spiders often found in it. They frequently rob the female of this, and fly away to the next eminence, to regale themselves with the delicious morsel. Some perhaps escape; which may account for finding spiders on the tops of steeples and other high buildings.

The *aranea diadema* is generally of a large size, and hairy. They are very common in Europe in the autumn. The eggs disclose in the spring of the following year. The depositories of eggs of this species of spider are the most easily discovered during the winter months; as they may be found in the angles of walls, in the form of a ball, about the size of a cherry, of beautiful yellow silk, and much stronger than the common materials of the same spider's geometric web. As the eggs of spiders have usually a thin, soft shell, a thick, warm envelope of silk is no doubt essential to their weathering the colds of winter, notwithstanding the sheltered corners where they are usually placed.

Some species weave their little silken nets in a very elegant form. Some are in the pyriform shape of a balloon, the texture of which is close, and netted with diagonal meshes; some are in the form of a drinking-glass, as figured in Loudon's Magazine of Natural History, from a specimen found near Wandsworth, attached to the stem of a rush growing in water. There was a deposition of eggs at the bottom, the rest of the space being vacant. De Geer describes similar spiders' nests attached to the stems of grass; and Swammerdam also found a large one of an elongated shape, composed of very white silk, on a spike of grass at Compton Basset, Wiltshire. Germs in general can support 2° below zero, whereas, of animalculæ, some die at the freezing-point, and some at about 20°. The eggs of many insects continue fertile after being subjected to a temperature of 22° below zero, while insects themselves die at 16° and 14°.

In experiments made on the eggs of the wolf-spider (*lycosa saccata*), more than once the young were kept in boxes, where they were forgotten, and without food; it was uniformly found that they remained lively and well so long as they did not cast their embryo skin;

but when they did moult, they could not long survive the want of sustenance. This creature, which is of a dark greenish grey colour, when it is alarmed, does not, as most of its kindred would do, take shelter in the grass, nor in the holes of the bank, but trips away over the water, where, it appears instinctively to know, it could not easily be pursued.

This is not the diving water spider (*argyroneta aquatica*); for though it can dive, and remain under water, it does not seem to relish this, except when driven to the measure.

Some of these water insects have such slender feet, that their not sinking in the water can only be explained on the same principle as that of a small needle floating, when very dry, and laid exactly level. Others again have their feet fringed with fine hairs, which buoy them up.

M. Amédée Lepelletier de St. Fargeau has observed, that these animals, as well as the *crustacea,* possess the faculty of regenerating their lost members. Mr. Gosse tells us that in Jamaica a large spider, of the genus *lycosa,* inhabits houses and heaps of stones. In both of these rather dissimilar situations it retains the same habits; the female carries constantly about an egg-bag of buff-coloured silk, perfectly circular, rather more than an inch in diameter, but flat, being about two lines in thickness, with a narrow, thin edge all round. The spider crawls about with this nest beneath her body, her feet sprawling around its edges; and nothing will induce her to part with it.

The gossamer spider, or *aranea obtextrix.* — The following observations on the origin of the gossamer, by Mr. Beckstein, a German naturalist, are curious, and convey a more accurate account of it than I have been able to meet with in any other writer.

Some naturalists (says this gentleman) have considered this phenomenon as the evaporation of plants condensed, during the cool days of harvest, by the air, and converted into threads like those which can be drawn from resinous juices; others, as the production of a kind of spider, on account of its similarity to the threads of common spiders; and Mr. Pereboon has discovered a kind of beetle, furnished with a vesicle on its back, from the hinder parts of which, on both sides, proceed two threads that extend over the extremity of the body, and end in a double thread, sometimes ten or more inches in length, which thread he supposes to form the gossamer. Having made, for many years, the closest observations on this phenomenon, I am of opinion it is caused by a species of field spider, so small and active as to be imperceptible, unless the observer possess a very acute sight. This spider, if it have no name already, I propose to call the "gossamer spider," *aranea obtextrix*. It is about the size of the head of a small pin. Its head is somewhat long, and has in the forepart eight grey eyes, placed in a circular form. The body is of a shining dark brown colour, with the abdomen shaped like an egg. The legs are yellowish.

These spiders first appear in the beginning of October, in woods, gardens, and meadows, where their eggs are hatched in safety; thence they spread themselves over whole districts, and during the rest of October, and till the middle of November, may be found in dry fields throughout Europe. Extensive tracts of land are sometimes seen swarming with them. In the beginning of October, when but very few are hatched, some single threads of their webs, extending from twig to twig, are seen only in the sunshine; about the middle of the month their threads are more perceptible; and towards the end, if a person stand in such a position as to see the sunbeams play on the slender threads—hedges, meadows, corn-fields, stubble land, and even whole districts, appeared covered as with a sort of fine white gauze.

The gossamer spider does not weave a web, but only extends its thread from one place to another. These are so delicate that a single thread cannot be seen unless the sun shines on it. One of them, to be visible at other times, must be composed of at least six common threads twisted together. In serene calm days these spiders work with great diligence, especially after the disappearance of the morning fogs. Between twelve and two, however, their industry excites the greatest admiration. A person with a pretty quick eye, or by the help of a glass, may sometimes perceive among the barley stubble such a multitude of these insects, extending their threads, that the fields appear as if covered with swarms of gnats.

Several of the single threads become twisted together by the gentlest breath of wind, and form perceptible threads, which, being broken by stronger winds, unite into thick threads, or even into balls, and float through the atmosphere. These are then called in Germany, the flying summer, because the summer seems to fly away at the same time. The spiders are conveyed in them; but it is not uncommon to find spiders of other species in them, which have been entangled and dragged away; and even the webs of other spiders, and the dried husks of insects that have been caught by them, are often found in the gossamer.

The gossamer spiders appear in swarms only during the harvest; but single spiders are to be found through the whole summer.

We have a very curious account of the gossamer, inserted by Mr. White, in the Natural History of Selborne:—"On September the 21st, 1741, being then on a visit, and intent on field diversions, I rose before day-break. When I came into the enclosure, I found the stubbles and clover grounds matted all over with a thick coat of cobweb, in the meshes of which a copious and heavy dew hung so plentifully, that the whole face of the country seemed as it were covered with two or three setting nets drawn one over another. When the dogs attempted to hunt, their eyes were so blinded and hoodwinked that they could not proceed, but were compelled to lie down and scrape the incumbrances from their faces with their fore-feet; so that, finding my sport interrupted, I returned home, musing in my mind on the oddness of the occurrence. As the morning advanced, the sun became bright and warm, and the day turned out one of those most lovely ones which no season but the autumn produces: cloudless, calm, serene, and worthy of the south of France itself. About nine, an appearance very unusual began to demand our attention; a shower of cobwebs falling from very elevated regions, and continuing, without any interruption, till the close of the day. These webs were not single filmy threads, floating in the air in all directions, but perfect flakes or rags, some nearly an inch broad, and five or six long, which fell with a degree of velocity that showed they were considerably heavier than the atmosphere. On every side, as the observer turned his eyes, he might behold a continual succession of fresh flakes falling into his sight, and twinkling like stars, as they turned their sides toward the sun.

"How far this wonderful shower extended would be difficult to say; but we know that it reached Bradley, Selborne, and Alresford, three places which lie in a sort of triangle, the shortest of whose sides is about eight miles in length. At the second of these places, there was a gentleman, for whose veracity and intelligent turn of mind I have the greatest veneration, who observed it the moment he got abroad, but concluded that, as soon as he came upon the hill above his house, where he took his morning rides, he should be higher than this meteor; which, he imagined, might have been blown, like thistle-down, from the common above.

But, to his great astonishment, when he rode to the most elevated part of the down, 300 feet above the level of his fields, he found the webs, in appearance, as much above him as before; still descending into sight, in a constant succession, and twinkling in the sun, so as to draw the attention of the most incurious.

"Neither before nor after this was any such fall observed; but on this day the flakes hung in the trees and hedges so thick, that a diligent person sent out might have gathered baskets-full.

"The remark that I shall make on these cobweb-like appearances, called gossamer, is, that strange and superstitious as the notions about them were formerly, nobody in these days doubts but that they are the real production of small spiders, which swarm in the fields in fine weather in autumn, and have a power of shooting out webs from their tails so as to render themselves buoyant, and lighter than air. But why these apterous insects should that day take such a wonderful aërial excursion, and why their webs should at once become so gross and material as to be considerably more weighty than air, and to descend with precipitation, is a matter beyond my skill. If I might be allowed to hazard a supposition, I should imagine that those filmy threads, when first shot, might be entangled in the rising dew, and so drawn up, spiders and all, by a brisk evaporation, into the regions where clouds are formed; and, if the spiders have a power of coiling and thickening their webs in the air, as Dr. Lister says they have, then, when they became heavier than the air, they must fall.

"Every day, in fine weather, in autumn chiefly, do I see these spiders shooting out their webs and mounting aloft; they will go off from your finger, if you take them into your hand. Last summer, one alighted on my book, as I was reading in the parlour, and, running to the top of a page, and shooting out a web, took its departure from thence. But what I most wondered at was that it went off with considerable velocity in a place where no air was stirring; and I am sure I did not assist it with my breath. So that these little crawlers seem to have, while mounting, some locomotive power without the use of wings, and to move in the air faster than the air itself."

A remarkable flight of spiders is thus described by Mr. John Thompson, of Hull. It occurred on the 29th July, 1829:—"A number (says he) of aëronautick spiders, at any rate small black spiders capable of flight, by some means found their way into St. John's

Church, and, though not a proper place for observations on natural history, there were so many, that, without shutting my eyes, I could not fail noticing them. The tops of ladies' bonnets were generally the places whence they commenced their flight, and in it they seemed not to be confined to any particular direction. Some flew upwards at a slight angle, some north, some south, some east, some west; and in so doing, several passed so near to each other, that I cannot conceive, as they passed in opposite directions, that any current of air conveyed them, as two opposite currents could scarce exist so often close to each other. I observed that those which passed near enough to distinguish their forms, all flew with their backs downwards."

The following interesting account of these aërial wanderers is by Mr. Charles Darwin, naturalist to the *Beagle*:—" On several occasions, when the vessel has been within the mouth of the Plata, the rigging has been coated with the web of the gossamer spider. One day (Nov. 1st, 1832), I paid particular attention to the phenomenon. The weather had been fine and clear, and in the morning the air was full of patches of the flocculent web, as on an autumnal day in England. The ship was sixty miles distant from the land, in the lirection of a steady, though light breeze. Vast numers of a small spider, about one-tenth of an inch in ength, and of a dusky red colour, were attached to he webs. There must have been, I should suppose, ome thousands on the ship. The little spider, when irst coming in contact with the rigging, was always eated on a single thread, and not on the flocculent nass. This latter seems merely to be produced by the ntanglement of the single threads. The spiders were all f one species, but of both sexes, together with young nes. These latter were distinguished by their smaller ize and more dusky colour. . . . . The little aëronaut, s soon as it arrived on board, was very active, running bout; sometimes letting himself fall, and then rescending the same thread; sometimes employing tself in making a small and very irregular mesh in the orners between the ropes. It could run with facility n the surface of water. When disturbed, it lifted up ts front legs, in the attitude of attention. On its first rrival it appeared very thirsty, and with exerted maxillæ lrank eagerly of the fluid. This same circumstance has een observed by Strack: may it not be in consequence f the little insect having passed through a dry and rareied atmosphere. Its stock of web seemed inexhaustible. While watching some that were suspended by a single thread, I several times observed that the slightest breath of air bore them away out of sight, in a horizontal line. On another occasion, (25th,) under similar circumstances, I repeatedly observed the same small kind of spider, either when placed, or having crawled, on some little eminence, elevate its abdomen, send forth a thread, and then sail away in a lateral course, but with a rapidity which was quite unaccountable. I thought I could perceive that the spider, before performing the above preparatory steps, connected its legs together with the most delicate threads, but I am not sure whether this observation be correct. One day, at Santa Fé, I observed a spider, which was about three-tenths of an inch in length, and which, in its general appearance, resembled a citigrade (therefore quite different from the gossamer), while standing on the summit of a post, darted forth four or five threads from its spinners. These, glittering in the sunshine, might be compared to rays of light; they were not, however, straight; but in undulations, like a film of silk blown by the wind. They were more than a yard in length, and diverged in an ascending direction from the orifices. The spider then suddenly let go its hold, and was quickly borne out of sight. The day was hot, and apparently quite calm; yet, under such circum-

nces, the atmosphere can never be so tranquil, as
t to affect a vane so delicate as the thread of a
der's web. If, during a warm day, we look either
the shadow of any object cast on a bank, or over a
el plain, at a distant land-mark, the effect of an
ending current of heated air will almost always be
ident. And this probably would be sufficient to
ry with it so light an object as the little spider on
thread. The circumstance of spiders of the same
ecies being found on several occasions at the dis-
nce of many leagues from the land, attached in vast
mbers to the lines, proves that they are the manu-
turers of the mesh, and the habit of sailing through
e air is probably as characteristic of some tribes, as
at of diving is of the *argyroneta*. Mr. Virey's very
rious observations seem to prove that small spiders,
an atmosphere perfectly tranquil, and without the
d of any web, have the power of darting through the
. Mr. Virey believes, that by means of a rapid
ration of their feet, they walk the air. Although in
s case the conclusion seems almost inevitable, yet in
e one I have described, we must suppose that the
veral threads which were sent forth served as sails
r the atmospheric current to act on. After reading
r. Virey's account, Mr. Darwin thought it far from

improbable that the little aëronaut actually did unite its *feet* together by some fine lines, thus forming artificial wings; and regretted that he had not determined that point with accuracy. For, says he, it would be a curious fact that a spider should thus be able to take flight by the aid of temporary wings. Mr. Murray says: "It seems to me that the phenomena of the ascent of the spider will be found ultimately connected with the meteorology of the atmosphere, and the observation of its curious habits lead to some useful practical results; and none dare pronounce on the ultimate importance and value of any fact, generally unobtrusive in the beginning, but often finally forming the mighty fulcrum of some noble power, like that of *latent caloric* in the hand of Watt . . . . If the weather is likely to become rainy, windy, or the like, some spiders will fix the terminating threads by which their entire web is suspended, unusually short, and in this state await the impending change. On the other hand, if these threads are discovered to be long, we may conclude that it will be in that ratio serene, and continue so for about a week or more. If the spiders be completely inactive, rain will likely follow, but if, during the prevalence of rain, their wonted activity is resumed, this rain may be considered as of short duration, and be quickly followed by fair and constant weather. It has been also observed that spiders regularly make some alterations in their webs every twenty-four hours. If these changes are observed between 6 and 7 o'clock, P.M., they indicate a clear and pleasant night. It is beautiful to observe, on a fine summer's day, the threads that fan and flutter in the breeze from the trees and hedges; and they are often stretched across the road from hedge-row to hedge-row, particularly in a morning. . . . I have met with the *aranea aeronautica*, not only in Great Britain and on the level of the sea, but at Lausanne, in Switzerland. One alighted near me in the steam-packet, when traversing the lake of Geneva, and several miles from the shore. I have also met with this curious insect on Montanvert, on the very verge of the Mer de Glace. From the highest point of the cathedral of York, Dr. Lister beheld the gossamer webs floating far above him. The reapers in England sometimes call them money-spiders.

"The vast numbers that occur in the atmosphere are sufficient to account for the gossamer, and its beautiful and interesting phenomena. It cannot, therefore, be doubted, that those threads which glisten in the sunbeam, and float in the air, from the hedges and hedge-rows, and the reticular tissue on grass, which, when sparkling with dew, refract so beautifully the tints of the rainbow, are the work of the aëronautic spider. As a proof that these "wingless birds" are more numerous than may be generally suspected, it may be mentioned that in the month of July, 1822, on the top of the coach from Kidderminster to Stourbridge (a distance of only nine miles) there fell, on or near Mr. Murray, thirteen aeronautic spiders, all of which he caught, and imprisoned in chip boxes, which he carried with him for the purpose. This species of spider may be frequently met with in coach-offices, having alighted on the passengers, or on their luggage.

"On the 16th of September, 1822, at Bewdley, in Worcestershire, between the hours of 11 A.M. and 2 P.M., the whole atmosphere seemed to be a tissue of cobwebs, which continued to fall in great numbers, and in quick succession. The temperature was 72° Fahrenheit. Some of them were single, others branched filaments, occasionally seemed to extend from forty to fifty feet in length; others were woolly films, or flocculi; some fell slowly, and others more rapidly. This was first noticed in the market-place, at Bewdley; and, on repairing to the adjoining fields, Mr. Murray found the same phenomenon, and his clothes were most curiously invested with a net-work of spiders' threads. The fall of cobwebs was observed on the same day by the Rev. J. J. Freeman, at Kidderminster, who wrote that, "A gentleman told him he was obliged to wipe his face several times while walking in his garden about twelve or one o'clock, as such quantities continued to fall on him. On the 19th of July, 1822, (the anniversary of the royal coronation) the yeomanry, at 1 P.M., were drawn up in the market-place in Kidderminster, and fired a *feu de joie* on the occasion. This had the effect of bringing great numbers of the *aranea aeronautica* from the aërial regions; very many were picked up from the pavement when the yeomanry had withdrawn. . . . . . A free and unrestrained privilege of ascent into the atmosphere is a condition essential to the very being of these remarkable insects. . . . . . They are impatient of confinement, and will die, whether imprisoned in a chip-box or glass tube (showing that light does not affect the question); sometimes in *twenty* hours, or at most in two or three days. Mr. Murray has made several very interesting experiments, which have satisfied him that their motions are the results of electrical influence. One warm day, with brilliant sunshine, at noon, he observed one of these spiders in the act of propelling its threads in all directions, when it suddenly darted on toward the door, in the direction of the influx-current, perfectly horizontal, and in length ten feet. The angle of vision being particularly favourable, he observed an *extraordinary aura or atmosphere round the thread,* which he had no doubt was electric.

"When walking in the fields, they alight on the hat, and descend before the face; if received on a pencil, or the like, they will soon be perceived to oscillate like the pendulum, oftentimes rising from the perpendicular into the horizontal plane, at each ascent projecting a thread into the atmosphere; and finally, by a twitch or jerk, the insect breaks from its anchorage, and ascends. It is difficult to determine whether it bites off the connecting thread, or breaks it off by main physical strength; but from the sudden twitch which appears to detach it, Mr. Murray thinks the latter is the fact. Sometimes the aeronautic spiders will take their flight immediately from the surface on which they alight, if the day be warm and sultry; but generally they descend to from six to eighteen inches, perhaps the better to insulate themselves, and that, suspended by a pliant thread in free space, they may more freely propel their threads into the atmosphere. Not unfrequently, the propulsion of a solitary thread will bear them aloft, but the air must then be very warm, and its electric character be high. Sometimes the ascent is rapid, and cannot be followed by the eye; at other times it is slow and majestic. Occasionally the ascent is quite vertical, and at other times the animal sails on the bosom of the air, either in the horizontal plane, or at angles more or less acute.

"It will also be found that there are particular seasons of the year best calculated for this singular exhibition: spring and autumn are these periods. . . . . Several circumstances concur to show the phenomenon of ascent to be *electric*. The propelled threads do not interfere with each other; they are divellent, and this divergence seemed to proceed from their being imbued with similar electricity.

"The aeronautic spider, brought near a candle, descends by its vertical thread, winds it up, and ascends again very rapidly and repeatedly. The flame seemed not to attract a short upright thread, though the finger brought near did. Placed nearer to the flame, the animal seemed incapable of descending farther, but moved circularly. The point of a gold wire was brought near to the vertical thread, in one experiment, above the spider in the act of escape to the ceiling of the room. It evidently disconcerted its progress, and the animal seemed agitated and unable to ascend. On removing the point, the insect soon made its escape.

"When the conducting-wire is brought near to the thread by which it suspends itself, but, above all, to the flocculi or balls, the thread is considerably deflected from the perpendicular, and the horizontal fibre is attracted by the point. When a metallic conductor is brought near to the suspended spider, it disarranges its projectiles, and the insect, conscious of some counteracting agency, promptly coils up its threads. When a stick of excited sealing-wax is brought near the thread of suspension, it is evidently repelled, consequently the electricity of the thread is of a negative character. The descent of the thread is instantly determined by bringing upon it the excited sealing-wax; and, i strongly excited, and the spider let fall on its surface it bounds from it with considerable energy. . . . . . . An excited *glass* tube brought near, seemed to *attract* the thread, and with it the aeronautic spider. When the insect was thus *positively* electrified, the rapidity which marked its descent, and extent of thread spun out, which Mr. M. had repeatedly coiled up, was truly astonishing, being at least thirty feet in length . . . On the 4th of August, 1822, thermometer 66°, the ascent was slow and beautiful, the little aeronaut rising regularly in the vertical plane. It was distinctly perceived from the steady fixation of the eye, and favourable angle of vision, until it had attained an elevation of thirty feet at least, and was finally lost in the vanishing point of elevation. . . . . Were the thread not electrical, it is not easy to imagine how it could be propelled through the atmosphere in the vertical plane, and remain there, contrary to the laws of gravitation. The threads always remain in the precise plane in which they are propelled, nor even swerve from that path. It is difficult," continues Mr. Murray, "to ascertain what part this ascent into the atmosphere subserves in the economy of nature. The spider may mount on high in its electric chariot to thin the ranks of those clouds of the genus *staphylinus,* which, if suffered to remain undisturbed, might, for ought we know, increase even to the destruction of us and ours. Whether the spider becomes food for other insects, remains a question; but often while it oscillates, some prowling wasp, or wandering fly, has snapt and carried off my poor *aranea aeronautica.*"

The *tarantula,* or *aranea tarantula,* so denominated from the city of Tarentum, in Apulia, near which it is chiefly found. It is also called *phalangina Apulium.* Valetta, a monk of Apulia, who had always resided about the places where this mischievous animal is most frequent, and had many opportunities of tracing its several qualities, published a succinct, but very accurate history of it in the year 1706, under this name. It has its name, *phalangina,* from the three phalanges or joints of its legs; and this name equally suiting many other spiders, as well as this, it ceased to be its appropriated name, and was applied as a generical term to several other spiders of a larger kind, among which this species was always distinguished by the epithet Apulian, from the place where it was so frequently found.

"The *tarantula,* or *Apulian phalangina,* is frequent in all parts of Italy, in uncultivated places, but more especially it breeds most in sunny dry hills, and particularly in such parts of them as are exposed to the south. It is said not to be found any where except in Apulia, but probably it is an inhabitant of many other places, though its poison may not be violent enough anywhere else to bring on the effects it does there. . . . The peasants of Apulia have a method of getting the *tarantula* out of his hole, in order to destroy him. This they do by making a soft hissing noise through an oat straw; whether it be that the creature loves this sound, or rather that he takes it for the voice of some insect that he is used to prey upon, he always comes out, and falls a sacrifice to his greediness."

Pliny tells a story of the young ones always eating up their mother for the first food, which is countenanced by the relation of the peasants in those parts, who say that they all swarm about her and suck her juices . . . . till they leave her a lifeless carcase on the field . . . . The bite of the *tarantula,* and the method of its cure, were, for many years, subjects of elaborate discussion. It does not appear, from the experience of the most learned, that there is any truth in the musical remedies so long in use by the credulous and ignorant.

Serpents are very numerous in Guiana; and the largest kind is there by most people mistaken for the tarantula. The bite of this spider is deemed fatal; but I never knew of any animal who experienced its effects. They form strong, thick webs, not much larger than themselves, commonly between the branches of a cocoa-nut or plantain-tree. Their eggs are deposited in a white cloth-like bag, which is placed under the spider's belly, who, at certain seasons of the year, carries it constantly about until the brood is hatched. Never miser clung to his treasure with more tenacious solicitude than this spider to her bag.

Though apparently a very considerable incumbrance, she carried it with her everywhere. If you deprive her of it, she makes the most strenuous efforts for its recovery, and no personal danger can force her to quit the precious load. Are her efforts ineffectual? a stupefying melancholy seems to seize her, and, when deprived of this first object of her cares, existence itself appears to have lost its charms. If she succeed in regaining her bag, or you restore it to her, her actions demonstrate the excess of her joy. She eagerly seizes it, and with the utmost agility runs off with it to a place of security. Bonnet put this wonderful attachment to an affecting and decisive test. He threw a spider with her bag into the cavern of a large ant-lion, a ferocious insect,* which conceals itself at the bottom of a conical hole, constructed in the sand for the purpose of catching any unfortunate victim that may chance to fall in. The spider endeavoured to run away, but was not sufficiently active to prevent the ant-lion from seizing her bag of eggs, which it attempted to pull under the sand. She made the most violent efforts to defeat the aim of her invisible foe, and, on her part, struggled with all her might.

* See page 153.

The gluten, however, which fastened her bag, at length gave way, and it separated; but the spider instantly regained it with her jaws, and redoubled her efforts to rescue the prize from her opponent. It was in vain. The ant-lion was the stronger of the two, and in spite of all her struggles, dragged the object of contention under the sand. The unfortunate mother might have preserved her own life from the enemy. She had but to relinquish the bag, and escape out of the pit. But, wonderful example of maternal affection! she preferred allowing herself to be buried alive along with the treasure dearer to her than her existence; and it was only by force that Bonnet at length withdrew her from the unequal conflict. But the bag of eggs remained with the assassin; and though he pushed her repeatedly with a twig of wood, she still persisted in continuing on the spot. Life seemed to have become a burthen to her, and all her pleasures to have been buried in the grave which contained the germs of her progeny.

The attachment of this affectionate mother is not confined to her eggs. After the young spiders are hatched, they make their way out of the bag by an orifice, which she is careful to open for them, although experiments have proved that they can escape, without maternal assistance; and then they attach themselves in clusters upon her back, belly, head, and even legs; and in this situation, where they present a very singular appearance, she carries them about with her, and feeds them until their first moult, when they are big enough to provide their own subsistence.

The tarantula, or *aranea tarantula*, is somewhat more than an inch in length, and has its breast and belly of an ash-colour; its legs are likewise ash-coloured, with blackish rings on the under part. Its fangs are red within. It is a native of Italy, Cyprus, Barbary, the East Indies, and South America. This animal lives in fields, and its dwelling is about four inches deep, half-an-inch wide, and closed at the mouth with a net. At the bottom this is curved; and there the insect sits in wet weather, and from thence cuts its way out, if water gain upon it. These spiders do not live quite a year. They lay about 730 eggs, which are hatched in the spring. The parents never survive the winter.

Inflammation, difficulty of breathing, and sickness, are said to be the invariable consequents of the bite of this creature. Dr. Mead, and other medical men, have countenanced the ridiculous story of these effects being counteracted by the power of music. It is, however, now well known, that this singular mode of cure was nothing but a trick frequently practised on credulous travellers, who were desirous of witnessing it.

Mr. Swinburne, when he was in Italy, minutely investigated every particular relative to this insect. The season was not far enough advanced, and it was pretended that no persons had that year been yet bitten. He, however, prevailed upon a woman, who had formerly been bitten, to dance the part before him. Several musicians were summoned, and she performed the dance, as every one present assured him, to perfection. At first, she lolled stupidly on a chair, while the instruments played a dull strain. They touched, at length, the chord supposed to vibrate to her heart, and up she sprung with a most hideous yell, staggered about the room like a drunken person, holding a handkerchief in both hands, raising them alternately, and moving them in very true time. As the music grew brisker, her motions quickened, and she skipped about with great vigour, and in a variety of steps, every now and then shrieking very loud. The scene was unpleasant, and, at his request, an end was put to it before the woman was tired.

He informs us, that whenever they are to dance, a place is prepared for them, hung round with bunches of grapes and ribbons. The patients are dressed in white, with red, green, or yellow ribbons; on their shoulders they have a white scarf; they let their hair fall loose about their ears, and throw their head quite back. He says that they are exact copies of the ancient priestesses of Bacchus.

The introduction of Christianity abolished all public exhibitions of heathenish rites; but the women, unwilling to give up their darling amusement in performing their frantic characters of Bacchantes, devised other pretences; and he supposes that accident led them to the discovery of the tarantula, on the strength of whose poison the Apuglian dames still enjoy their old dance, though time has effaced the memory of its ancient name and institution.

If these dancers are at any time really or involuntarily affected, Mr. Swinburne supposes it must be from some attack upon the nerves, a kind of St. Vitus' dance. That all are not, however, of Mr. Swinburne's opinion, may be seen by the following relation, given by the author of "A Summer in Andalusia," of a scene he witnessed at the town of Aleala.

"As I was passing through one of the better streets, the sound of a guitar caused me to stop at the door of a house, on the threshold of which sat a woman spinning, while a man stood leaning against the wall outside, calmly smoking his cigaretto. Seeing I was a foreigner, curious to know what was going forward, they asked me to enter the inner apartment, whence the music proceeded. I did so, expecting to witness a bolero, or some scene of gaiety. It was in truth a dance, but a dance very different from any I had anticipated. The guitar was played by a man, who, as he touched its strings, moved slowly round the room, backwards, followed by a girl, who danced wildly before him, with the most violent action, and horrible contortions of her limbs, and with the rolling eye and frenzied looks of a maniac. Thus they continued for some time to make the circuit of the apartment, the girl following the man so closely, as almost to push him backward, till she began to exhibit signs of exhaustion; her action gradually became less violent, and her companion appeared to soothe her with a softer, gentler strain. At length, as if her strength entirely failed her, she sunk senseless on the floor, and the music ceased.

"I had stood speechless with astonishment during this strange spectacle; addressing the man, who now for the first time seemed aware of my presence, I begged an explanation. 'She is my daughter,' was the reply, 'and was bitten some months since by a large spider, which has caused these fits, and nothing will quiet her but the guitar, which sends her to sleep, as you see.' 'Is she cured, then?' I asked. 'Not yet: I expect she will now wake in another fit;' and, in fact, she presently showed signs of returning animation. The man instantly resumed the guitar; the girl got up, and again commenced her frantic dance. Again her father led her round the room, and again she dropped exhausted on the ground.

"It was enough; I had satisfied my curiosity as to the effects of the bite of the tarantula; and, shocked with the scene, I quitted the house. Half-an-hour afterwards, on passing the door, I heard the notes of the guitar, which were doubtless accompanied by the same horrid dance."

The poisonous mechanism consists of two nippers, or fangs, on the fore part of the head, with strong points, toothed like a saw, and terminating in claws, like those of a cat. A little below the point of the claw there is a small hole, through which the animal emits the poison; and from this apparatus its means of attack and defence are derived. But the tarantula never inflicts its bite but when accidentally irritated; and though its bite always produces most severe pain, swelling, and discoloration of the part, and in some constitutions of peculiar irritability, fainting fits, spasmodic affections, and even convulsions—yet it has in no instance, within the experience of Dr. Lempriere (founded on a four years' residence in the south part of Europe, and in Barbary,) proved fatal; and the symptoms are readily removed by the remedies efficacious in the bites or stings of other venomous insects.

It is stated to prefer the bare fields for its haunts, where the lands are fallow; but Dr. Lempriere, and many other authorities, have seen it often near houses, and within the yards, and sometimes in the apartments.

The *aranea holoserica,* and many other species, conceal themselves in a little cell formed of the rolled-up leaf of a plant, and thence dart upon any insect which chances to pass; while *aranea atrox* and its affinities select for their place of ambush a hole in a wall, or lurk behind a stone, or in the bark of a tree. *Aranea calycina* more ingeniously places herself at the bottom of the calyx of a dead flower, and pounces upon the unwary flies that come in search of honey; and *aranea arundinacea* buries herself in the thick panicle of a reed, and seizes the luckless visitors enticed to rest upon her silvery concealment. Many of this tribe at times quit their habitations, and, by various stratagems, contrive to come within reach of their prey, as by pretending to be dead, hiding themselves behind any slight projection, &c. A white species has been often observed by Mr. Kirby, squatted in the blossom of the hawthorn, or on the flowers of umbelliferous plants, and is thus effectually concealed by the similarity of colour.

Aranea fimbriata hunts along the margin of pools: and *lycosa.* The Rev. R. Sheppard has often noticed, in the fen ditches of Norfolk, a very large spider, which actually forms a *raft* for the purpose of obtaining its prey with more facility. Keeping its station upon a ball of weeds about three inches in diameter, probably held together by slight silken cords, it is wafted along the surface of the water upon this floating island, which it quits the moment it sees a drowning insect, in order to hasten its exit by a more speedy engine of destruction. The booty thus seized, it devours at leisure upon its raft, under which it retires when alarmed by any danger.

The *araneà sauvagesii,* or *venatoria,* a native of Tuscany and Corsica, and also of Syria.—A lady lately returned thence, says:—"They abound on Mount Lebanon." Its habitation is subterraneous, not a mere shallow cavity, but a tube or gallery upwards of two feet in length, and half-an-inch broad. This—for the size of the insect—vast tunnel it digs by means of its strong jaws, in a steep bank of bare clay, so that the rain may readily run off without penetrating to its dwelling. Its next operation is to line the whole from top to bottom with a web of fine silk, which serves the double purpose of preventing the earth that composes the walls from falling in, and, by its connection with the door of the orifice, of giving information to the spider of what is passing above. This door is composed of several coats of dried earth, fastened to each other with silk. When finished, its outline is as perfectly circular as if traced with compasses; the inferior surface is convex and smooth, the superior flat and rough, and so like the adjoining earth as not to be distinguishable from it. This door the ingenious artist fixes to the entrance of her gallery by a hinge of silk, which plays with the greatest freedom, and allows it to be opened and shut with ease. If an intruder attempt to elevate the door a little, he immediately perceives a strong resistance. The spider, warned by the vibrations o the threads which extend from the door to the bottom of her gallery, runs with all speed to the door, fastens its legs to it on one side, and on the other to the walls, and, turning upon its back, pulls with all its might. When the spider finds all resistance ineffectual, it betakes itself to flight, and retreats. If, to make a further experiment, the observer fastens down the door so that it cannot be forced open, the next morning he will find a new entrance, with a new door, formed at a small distance; or if he takes the door entirely away, another will be constructed in less than twelve hours. The habitation thus singularly formed and defended, is not at all used as a snare, but merely as a safe abode for the spider, which hunts its prey at night only; and, when caught, devours it in security at the bottom of its den, which is generally strewed with the remains of coleopterous insects. It appears from some curious observations of Mr. Dorthes, that both the male and female spider, and as many as thirty young ones, occasionally inhabit one of these galleries.

The galleries just described are the work of an European species, not uncommon in the south of France; but similar ones, on a much larger scale, are fabricated by the *aranea venatoria,* an inhabitant of the West Indian Islands, as well as by many other tropical species. Mr. Kirby has seen one which had been dug out of the earth, that was nearly a yard in length, and above an inch in diameter, forming a cylindrical bag of dark coloured silk, closed at the bottom, and accurately fitted at the top by a door or lid.

The following very full and interesting account of these creatures, is from the pen of Mr. Gosse, in his " Sojourn in Jamaica."—" In digging their mountain-gardens, the negroes often expose the curious subterranean nests of the trap-door spider (*ctenizа nidulans*) many of which are brought to me. This spider makes its tubular dwelling in soft earth, frequently choosing cultivated ground, on account, doubtless, of this quality; each nest is cylindrical, or nearly so, from four to ten inches deep, and about one inch in diameter; the bottom is rounded, and the top, which is at the surface of the soil, is closed very accurately with a circular lid. They are not at all equally finished, some being much more compact, and having the lid more closely fitted than others. Some have irregular bulgings and rugged laminated offsets on the outer surface; but all are smooth and silky in the inside. This smoothness, however, does not preclude little irregularities or unevennesses of surface, nor is it glossy; its appearance rather resembles that of paper which has been wetted and dried; it is always of a reddish-buff hue, but the outside is stained of the colour of the surrounding earth. The mouth of the tube, and the parts near it, are very strong; the walls here often having a thickness of from one-eighth to one-fourth of an inch; but the lower parts are much thinner. The lid is continuous with the tube for about a third of its circumference, and this part may be called the hinge, though it presents no structure peculiar to itself; it is simply bent at a right angle, as is manifest if a nest be cut longitudinally through with scissors, the incision passing through the midst of the lid.

"The mode of construction, I judge, from examination of many nests, to be this: The spider digs a cylindrical hole in the moist earth, with her jointed fangs or mandibles, carrying out the fragments as they are dislodged. When the excavation has proceeded a little way, she begins to spin the lining which forms the dwelling. I conclude thus, because nests are occasionally found a few inches in length, with the lid and upper part perfect, but without any bottom, these being evidently in course of formation. I suppose that she weaves her silk, at first, in unconnected patches, against the earthy sides, perhaps where the mould is liable to fall in, and thus I account for the loose rough laminæ of silk that are always found projecting from the outer surface. These are overlaid with other patches more and more extensive, until the whole interior walls are covered; after which, the silk is spun evenly and continuously all round the interior, in successive layers of very dense texture, though thin. Under the microscope, with a power of 220 diameters, these layers are resolved into threads, laid across each other and intertwined in a very irregular manner; some are simple, varying from 1-7000th to 1-2000th of an inch in diameter, and others are compound, several threads, in one part separate, being united in one of greater thickness, which cannot then be resolved. No pellets of earth are ever interwoven with silk to form the outer layers of the walls, though the adhesive nature of the silk, when freshly spun, causes fragments of earth to remain attached to the surface. The mouth of the tube is commonly dilated a little, so as to form a slightly re-curved brim or lip; and the lid is sometimes a little convex internally, so as to fall more accurately into the mouth, and close it. The thickening of the hinge by additional layers is, I think, accidental only, as, out of many specimens that I have examined, only one or two had such a structure. In the neatest examples, the lid is of equal thickness throughout its extent, agreeing also with the walls for the first few inches of their depth.

"One of peculiar compactness, now before me, I have slit open longitudinally with a pair of scissors, in the manner spoken of above. The thickness of the substance is in no place greater than the sixteenth of an inch, which is very regularly maintained throughout the lid and upper parts. The appearance at the cut edge closely resembles that of millboard so divided; the layers of which it is composed being very numerous and compact, especially towards the interior side, where they can scarcely be distinguished, even with a lens. In this specimen there is what I cannot find in any of the others that I have examined—a row of minute holes, such as might be made by a very fine needle, are pierced around the free edge of the lid, and a double row of similar ones just within the margin of the tube. There are about fifteen or sixteen punctures in each series; and they penetrate through the whole substance, the light being clearly seen through each hole. Now, what is the object of these orifices? I do not think, as I have somewhere seen suggested, that they are intended to afford a hold for the spider's claws, when she would keep her door shut against the efforts of an enemy; for what would be the use of having them in the tube, *close to the lid,* so close, that not the eighth of an inch intervenes between the series of a lid and that of the tube, when the former is tightly closed? I would suggest whether they may not be air-holes; for so tight is the fitting of the lid, and so compact the texture of the material, that I should suppose the interior would be impermeable to air, but for this contrivance. And as those in the horizontal lid might possibly be closed by minute particles of earth rolling on it, the second row around the edge of the perpendicular tube, just at the surface of the ground, would still be available in such a contingency. They may admit also an appreciable amount of light. On viewing such a structure, with its beautiful contrivances for security and comfort, we may well say with the Psalmist, 'O Lord, how manifold are thy works: in wisdom hast thou made them all!'

"The spider that inhabits this nest is black, with the thorax of an exceedingly lustrous polish; its abdomen is full and round, its legs very short. It retreats on alarm to the bottom of its tube, whence it is very reluctant to be dragged; and, when exposed, seems inert and helpless. Yet it is much dreaded, its bite being reputed to cause tumefaction, and painful fever."

The generic character of the *aranea venatoria*, or American tarantula, is thus described by Brown: Legs eight; eyes eight; mouth furnished with two hooks or holders; palpi or feelers, two; abdomen terminated by papillæ or teats, through which the insect draws its thread. The *aranea venatoria* inhabits Jamaica, and other American islands. It constructs in dry and sandy situations a cylindrical nest, of five or six inches in length, furnished with an elastic closing valve. In this nest the animal awaits the arrival of its prey, viz., any insect flying or creeping near; and, suddenly rushing out, secures its victim, which it drags into the nest, and devours at leisure; the valve immediately closing behind it.

The *aranea castanea*, so called from its brown pubescent body, is of the same species. Also the black tarantula.

We are told by Barrow, in his "African Travels," that a species of lily, the leaves of which form a fan, has been ascertained to be a most virulent poison; and it is said that the juice of the bulb, mixed with the mangled body of a certain kind of spider, furnishes one of the most deadly poisons for the arrows of the Bosjesmans. From the following description, it seems to be the *aranea venatoria,* or *sauvagesii.* This spider has a black and hairy body, which, together with its short legs, is three inches in breadth. It lives under ground, and constructs over its hole a cover composed of its own filaments, and earth, or dung, and turning on a joint, like the lid of a snuff-box. When the spider is watching for its prey, it sits with the lid half open, ready to sally out of its hole. On the appearance of danger, it closes the cover, and, after some time, opens it cautiously to see if the danger be past.

In the coasts forming the republic of Central America, there is a sort of spider, not resembling the tarantula, having the body of a blue colour, and working a large and strong web, which is said to have the power of poisoning by a liquor it discharges from its body. From the mere touch of it several people have died; and the only remedy, it is said, is to immerse those who have suffered from its contact, in water, till they are nearly choked.

The *aranea viatica,* or wandering spider, does not lie in wait for its prey, like several others. It is a lively active hunter. Its head is furnished, as in the rest, with immoveable eyes, without any motion of the head. It perceives all the flies that hover around, and without the least appearance of alarming, stretches its arms over them: these being furnished with feathers, prove nets that entangle their wings. The spider then seizes them with its merciless claws, and sucks their blood. The males often fall victims to the females; and the latter carry on a cruel war against each other.

Whenever they meet, if one spider should happen to fall into the web of another, a desperate and mortal combat immediately takes place. When the two combatants are of equal strength, they wound each other reciprocally. The proprietor of the web is almost always the aggressor; the stranger remains on the defensive. But when the first finds itself the weaker of the two, it flies, and yields its web to the other, which never pursues, but remains, and profits by the labour of its adversary.

It often occurs, according to Geoffrey, that some old *araneides* take possession by force of the web of a younger spider; because, with the advance of age, the reservoir of the fluid which furnishes their threads becomes exhausted, and they can no longer construct a web, of which they, nevertheless, have need, for the purpose of catching their prey: they therefore compel a young one to give up its own. According to the same author, each spider has a sufficient quantity of the silky matter to make six or seven webs during its life. When no more remains, they must either die, or appropriate to themselves the productions of others.

It has been observed, that those animals which have been intended to subsist by rapine are, for the most part, disposed to live solitary; but to this rule, spiders of various species are an exception, since their nets are often spread contiguous to one another, sometimes even in contact. It appears very singular, that spiders who weave snares, though of the same species who have no hesitation in devouring one another when they can make a capture, will not touch anything which they have not themselves entrapped.

The *aranea cicatrosa,* which is of a greyish-brown, or obscure yellow, with a black band festooned and bordered with grey along the middle of the back, weaves its web against walls or other bodies; and remains concealed in a nest of white silk, which it forms under some projecting part, or in some cavity near its web. It neither works, nor takes any nutriment, except at night, or when the light of day is feeble. It withdraws under the old bark of trees or stakes.

The *epeira turca* is very common in the cellars of the town of Angers. Its cocoon is white, almost globular, fixed by a pedicle, and composed of very fine threads, and as soft to the touch as wool.

That of the *epeira fascicata* is about an inch in length, resembles a small balloon, of a grey colour. The interior presents a very fine down, which envelopes the egg. This species establishes itself on the banks of rivulets, and there spins a vertical web, not very regular, at the centre of which it remains. It is very common in the south of France. Its corslet is covered with a silken and silvery down. It spins between the stems and leaves of plants a horizontal web of no great extent.

The *epeira comica,* so called from its curious shape, suspends to a thread the insect which it has sucked.

Aranea extensa has no wings; the abdomen long, greenish, and silvery. Legs very long, by which, as well as their position, it is particularly distinguished. It runs very fast, not supposed to be a ground spider; found on oaks in August, in Great Britain.

Aranea globosa, a beautiful spider, commonly seen on the young oaks in this country, in May and June. It is black, abdomen globular, sides crimson; web of a very slight texture.

Aranea cinerea, is a common spider in woods in this country; found in May and June. Abdomen ash-colour or grey; thorax and feet yellow-brown.

The laterigrade spiders, instead of walking straight forward, most usually walk obliquely, and often at right angles to the line of their own bodies. The four anterior feet are always longer than the others; sometimes the second pair exceeds the first, and sometimes they are nearly equal. The animal extends them in their whole length on the plane in which it is situated. Their eyes are always eight in number, often very unequal, and form, by their union, the segment of a circle, or a crescent. These arachnides remain tranquil, the feet extended, on vegetables: they form no web, but simply throw out some solitary threads, for the purpose of arresting their prey. They conceal themselves between leaves, the edges of which they draw together, and watch assiduously until the birth of their young.

Mr. Darwin collected thirty-seven species of *arachnidæ.* Writing from Rio de Janeiro, he says, "The number of spiders in proportion to other insects, is here, as compared to England, very much increased; perhaps more so than with any other division of the articulate animals. The variety of species among the *saltigrade,* or jumping spiders, appears almost infinite.

The genus, or rather family, of *epeira*, is here characterized by many singular forms. Some species have pointed coriaceous shells, others enlarged, and spiny tibiæ. Every path in the forest is barricaded with the strong yellow web of a species belonging to the same division with the *evira claripes* of Tolinius, which was formerly said by Sloane to make in the West Indies webs so strong as to catch birds. A small and pretty kind of spider, with very long anterior webs, and which appears to belong to an undescribed genus, lives as a parasite on almost every one of these webs. I suppose it is too insignificant to be noticed by the great epeira, and is therefore allowed to prey on the minute insects which, adhering to the lines, would otherwise be wasted. When frightened, this little spider either feigns death by extending its front legs, or suddenly drops from the web. A large epeira, of the same division with *epeira tuberculata*, and *conica* (with fleshy prominences on its abdomen), is extremely common, especially in dry situations. Its web, which is generally placed among the great leaves of the common agave, is sometimes strengthened near the centre by a pair, or even four zig-zag ribbons, which connect two adjoining rays. When any large insect, as a grasshopper, or wasp, is caught, the spider, by quickly giving it a revolving movement, and at the same time emitting a band of threads from its spinners, soon envelopes its prey in a case like the cocoon of a silk-worm. The spider now examines the powerless victim, and gives the fatal bite on the hinder part of its thorax; then, retreating, it patiently waits till the poison has taken effect. The virulence of this poison may be judged of, from the fact, that in half-a-minute I opened the mesh, and found a large wasp quite lifeless. The epeira always stands with its head downwards, near the centre of the web. When disturbed it acts differently, according to circumstances. If there is a thicket below, it suddenly falls down. I may remark, that I have distinctly seen the thread from the spinners lengthened by the will of the animal while yet stationary, as preparatory to its fall. If the ground is clear beneath, the epeira seldom falls, but moves quickly through a central passage, from one to the other side. When still further disturbed, it practises a most curious manœuvre. Standing in the middle, it violently jerks the web, which is attached to elastic twigs, till at last the whole acquires such a rapid vibratory movement, that even the outline of the spider's body becomes indistinct.

"I will here mention a gregarious epeira, found in great numbers near Santa Fé, Bajada, the capital of one of the provinces of La Plata. The spiders were of a large size, and of a black colour, with ruby marks on their backs. They were nearly all of one dimension, and therefore could not have been a few old individuals with their families. The webs were placed vertically, as is invariably the case with the genus epeira. They were separated from each other by a space of about two feet, but were all attached to certain common lines, which were of great length, and extended to all parts of the community. In this manner, the tops of some large bushes were encompassed by the united nets. Agara has described a gregarious spider in Paraguay, which Walckenaar thinks must be a theridion, but probably it is an epeira, and perhaps even the same species as mine. I cannot, however, recollect seeing a central nest, as large as a hat, in which, during autumn, when the spiders die, Agara says the eggs are deposited. These gregarious habits in so typical a genus as epeira, present a singular case among insects which are so blood-thirsty and solitary, that even the sexes attack each other, and the female often destroys the male.

"In a lofty valley of the Cordillera, near Mendoza, I found another spider, with a singularly formed web. Strong lines radiated in a vertical plane from a common centre, where the insect had its station; but only two of the rays were connected by a symmetrical meshwork; so that the net, instead of being, as is generally the case, circular, consisted of a wedge-shaped segment. All the webs were similarly constructed."

Mr. M'Leay says: "The truth is, that naturalists as yet know but little of *arachnidæ*. Leon Dufour, Koch, and even the distinguished Walckenaar himself, are acquainted with but few extra-European forms compared with the immense variety that exist. The great majority of species are inhabitants of warm climates, and being in general extremely difficult to preserve, are rare in our collections. Yet no annulosa are more curious in their structure, or perform more important functions in the economy of nature." He adds, "A true spider may have a distinct head; an articulated thorax and abdomen; that spiders may have only two eyes; and that those which have eight may have them disposed in systems very different from any of the systems hitherto described: finally, that although spiders in general have their labial palpi like feet, some species on the other hand may have their true feet like palpi, and their labial palpi without ungues.

Nops guanabacoæ.—The trivial name of this remarkable spider will serve to commemorate Guanabacoa, the place where Mr. M'Leay first found it; a place in which he long resided, "devoting," says he, "many delightful hours to the study of natural history. The genus *nops* is easily known from all other spiders, by having only two eyes. These are round, black, and, when alive, very brilliant; but they have no iris. In the species *nops guanabacoæ* they are set in the middle of a black spot, which is on the fore part of the egg-shaped cephalo-thorax. The sternum has vestiges of those eminences at the base of the feet, which distinguish *ariadne* and certain American forms of *dysdera*. This spider has only two pulmonary pouches; or, if it has four, the additional ones are very small. It is common under stones in woods; and occurs also, though more rarely, in houses. Mr. M'Leay states also, that he never saw it making a web; so that in this respect it agrees with some of the *drapi*. In fact, it connects the *dysderina,* such as Savigny's sub-genus *ariadne,* with certain drapinx, such as Savigny's sub-genus *lachesis.* The *dysderina* form a curious group. In them, not only have we the eyes varying in number, two, four, six, or eight, but the organs of mandulation are in some species rudimentary, and in others excessively developed. Mr. M'Leay possesses specimens of a translucid West Indian spider, closely allied to *fillistata,* and having mygalidous eyes, situated on the balloon-shaped cephalo-thorax of a *nops*. In these specimens, the antennæ, maxillæ, &c., are so rudimentary and inconspicuous, as would almost make one doubt that the species can be an animal of prey, were it not found making an irregular web in the corners and crevices of houses. The species called *clubiona,* and other comparatively delicate genera, form the food of *hymenoptera,* like *pelopaens,* and even of *diptera.* Mr. M'Leay has caught various species of *asilidæ* in the act of devouring these tender-skinned spiders; so that if certain spiders live on flies, there are also certain flies that live on spiders.

Hypoptatea celer.—This species is common in Cuba, darting, in the rainy season, with extreme velocity over the plastered floors. Its body and legs are extended so flatly on the surface on which it moves, and, moreover, it has the thomisidous faculty of running backwards so strongly developed, that it is sure, along with various little lizards, to attract the attention of new-comers, when, owing to certain qualms inside, and torrents of rain outside, they shut themselves up in their apartments, to ponder gloomily over the novelties of a West Indian climate. Other species of the genus are only to be found on the trunks of trees. These are seen like a ray of light to flash before the entomologist, when they have been dislodged by his stripping off the bark in search of insects. . . They lie in wait for their prey like the saltigrade spiders, of which *thomisus* is the type; but instead of leaping on their food, like *thomisus*, they catch it by their extreme velocity in running. *Ctenus* is not a laterigrade spider, but has all the habits and structure of the wolf spinner, as Mr. M'Leay knows by experience, the genus being very common in Cuba.

It is observable that in the correct description given by Mr. M'Leay, of this creature,* he says: "Feet, the last pair but one the longest; *tarsi*, having a cushion surmounted by two very minute ungues." This is taken notice of to maintain the compiler's opinion, that spiders are the creatures signified in the Bible, where it is said, 'She taketh hold with her hands;' and not lizards, as some have supposed."

Deinopis lamia.—One of the distinguishing chateristics of the class *arachnidæ*, is the disposition of the segments of their body to become confluent, even when, as for instance in the scorpions, the segments are in general distinct, the head remains confluent with the thorax. But what makes the present spider above all others interesting, is the position of the eyes, which are remarkably unequal in size. Two of them are dorsal, as usual, but the other six have a rather novel situation, not being visible when we look on the back of the insect. The head, being truncated in front, presents, like that of certain saltigrade spiders, or rather like certain *crustacea,* a vertical face. Half of this face is occupied by two enormous black eyes, set in blood-red circular rims, which touch each other laterally, and form irides that give our spider a most truculent aspect. *Deinopes* are found under stones, in the island of Cuba.

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* Annals of Natural History, ii. 6.

Myrmarachal melanocephala.—This handsome spider is a native of Bengal, and is even still more like than *myrmecium* to an ant or *mutilla.* Its hard corneous envelope, its distinct head, and inseated body, all tend to aid the deception in a most striking manner. Nothing is certainly known with respect to the manners of these curious spiders; but Mr. M'Leay supposes, from analogy, that they may eventually be found to feed on ants. It has been long known that the *volucellæ,* in their larva state, live in the nests of the bombi they so much resemble; and Mr. M'Leay has discovered that the larvæ of those tropical *bombylii,* which have such a beehive-like form, live on the larvæ of the bees they so strikingly represent. Perhaps, in like manner, the object of these spiders' striking forms is to deceive the ants on which they prey.

Œtiothops Walckenaar; named by Mr. M'Leay after the Baron Walckenaar; found under stones in the woods of Cuba. The eyes are remarkable from the confluence of the two hinder ones. Another singular character is the first pair of feet, which are palpiform, and different in structure from the two last pair: thus demonstrating how in *arachnidæ* true feet may become palpiform, in the same way as, more ordinarily, true palpi become pediform. The conversion of the organs of the mouth into organs of locomotion, and again, of true feet into organs of mandulation, is a singular characteristic of certain *apterous annulosa.*

The *aranea avicularia,* or bird-catching spider:—If, says Bingley, the spiders that are found in Europe are looked upon with aversion and alarm by those who are in the habit of constantly seeing them, surely this American species, whose gigantic size and great muscular power render it a terror even to the feathered tribes, cannot be beholden without the most violent sensations of horror. This enormous creature will extend with its feet a space of near ten inches. From the head to the extremity of the abdomen it often measures above three inches. The legs are as thick as a goose's quill, and closely covered with hair. The body is brown, and the fangs are as strong and sharp as in some of the rapacious species of birds. It is not uncommon in many parts of America, but is principally found in the southern division of that Continent, and particularly in Guiana. Captain Stedman, while residing in Surinam, had one of them given to him, which he put into a case-bottle above eight inches high; and when this was filled with spirits, the animal reached the surface with some of its claws, while others rested on the bottom. On the whole, he says, this spider is so hideous a creature, that the very sight of it is sufficient to occasion a tremor of abhorrence, even in persons most accustomed to inspect the deformities of nature.*

It resides in the trees, and frequently seizes on small birds, which it destroys by sucking their blood, after having first wounded them by its fangs, which distil a poisonous liquid into the wound. The slit or orifice near the top of the fangs, through which this poison is emitted, is so visible as to be distinctly perceived without a glass. Seba has figured a spider of this description, as descending from an arm of a tree, into the nest of a small species of humming-bird, to suck the blood of the parent and eggs. The eight eyes of this terrible insect are placed somewhat in the form of an oblong square in the front of the thorax. Of these, the two middle ones are so large, as to be capable of being set in the manner of glasses, and used as microscopes; the rest are smaller, and of an oblong shape. The thorax is orbicular, and has a transverse central excavation.

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* Stedman's Surinam.

The *aranea avicularia* is about an inch and a half in length, blackish, very hairy, with the extremity of the palpi, of the feet and the lower hairs of the mouth, reddish. Their cell has the form of a tube, narrowed to a point at its posterior extremity. It is composed of a white web, compact in its tissue, very fine, semi-transparent, and similar in appearance to muslin. One brought to this country was, when unfolded, seven or eight inches long, by about two wide, measured in its greatest transverse diameter. The cocoon of the same species was of the form and size of a large nut. Its envelope, composed of a silk similar in kind to that of its habitation, was formed of three layers. It appears that the young are hatched there, and there undergo their first moulting. Madlle. Merian says that they make their domicile in a tree named *grajava.* Stedman calls this animal the bush-spider.

It has been usual among naturalists to consider several very large exotic spiders, as constituting so many mere varieties of one single species, viz.: the *aranea avicularia* of Linnæus. It is, however, more than probable that *some* at least of these supposed varieties are really distinct species. The *aranea occidua*, or western spider, which is a native of South America and some of the West Indian islands, has been elegantly and correctly figured by Madame Merian in her work on Surinam, and by the ingenious Rosel, in his General History of Insects. Its generic character is as follows:—eyes eight, legs eight; mouth furnished with two hooks or holders; palpi, or feelers, two; abdomen terminated by papillæ or teats, through which the animal draws its thread. The brown spider of this species has a radiated excavation on the thorax, and rounded ferruginous feet. In a description of the *aranea avicularia* in the first volume of the *Ameintales Acădemicæ* of Linnæus, it is affirmed that the feet of that insect are furnished with only a single claw on each, and not with a pair, as in other spiders. This singular mistake must have arisen from the individual specimen examined for the purpose, being accidentally mutilated in this respect. The rest of the description is completely accurate. The tips of the feet are obtuse, and thickly covered with hair, amid which the claws are concealed.

The hair of the bird-catching spider of South America offers very great variety in structure, and an interesting subject for microscopic observation. That taken from the palpi is branched, and towards the extremity the central stem enlarges, becomes fluted, and assumes a bright orange colour. The use of this augmentation in bulk towards the end is not ascertained; but Mr. Pritchard remarks, that a similar structure on a large scale may be observed in the small feathers of the Indian humming-bird, which latter also affords interesting microscopic objects under moderate amplification.

There is a curious description of these frightful insects in Davies' History of the Cairbly Islands, written in the year 1666: "There are, in several of the islands, certain great spiders which some have ranked among the *phalanges*, by reason of their monstrous figure and bigness, which is so great, that when their legs are spread abroad they take up a larger place than the palm of a man's hand; their whole body consists of two parts, whereof one is flat, and the other of a round figure, smaller at one end, like a pigeon's egg. They have all of them a hole on their back. Their mouth cannot easily be discerned, because it is in a manner covered over with hair, which is commonly of a light grey, but sometimes intermixed with red; it is armed with two sharp tusks, which are of a solid matter, and of a black colour, so smooth and shining, that some curious persons have set them in gold for toothpicks, and are highly esteemed by those who *know;* they are endowed with a virtue to preserve from pain and all corruption those parts that have been rubbed therewith.

"When these spiders are grown old, they are covered all over with a swarthy down, which is as soft and as close as velvet; their body is supported by ten feet, which are a little hairy on the sides, and have below certain small points like bristles, which help them to fasten more easily on those places up which they would climb. All these feet issue out of the fore part of the insect, having each of them four joyntes, and at the ends they are armed with a black and hard horn which is divided into two parts like a fork.

"They every year shift off their old skin as the serpents do, as also the two tusks which serve them for teeth, and are their defensive arms.

"Their eyes are very little, and lye so deep in their heads, that they seem to be only two small points.

They feed on flies and such vermine, and it hath been observed, that in some places their webs are so strong that the little birds caught in them have had much ado to get away. The same thing is affirmed of the spiders which are found in the Bermudas."

In some places, in the forests of Java, the webs of spiders have been found, woven with threads of so strong a texture as not easily to be divided without a knife.

Dampier informs us, that at Campeachy in New Spain, there is a sort of spider of a prodigious size, some nearly as big as a man's fist, with long small legs, like the spiders in England. They have two fangs, each an inch and a half long and of a proportionable thickness, which are black as jet, smooth as glass, and at their small end as sharp as a thorn; these are not straight but bending. Some persons wear them in their tobacco pouches to pick their pipes with; others preserve them for tooth picks, especially such as are troubled with the toothache; for, if report may be trusted, they will expel that pain. The backs of these spiders are covered with a dark yellowish down as soft as velvet. Some say they are venomous, and others, that they are not; but the truth cannot be stated.

South America and the Antilles furnish other species, which are known by the French colonists under the name of *araignees crabes* (crab spider.) Their bite is supposed to be very dangerous.

Mr. Arthaud has caused death to chickens by causing them to be stung by the large crab spider of the Cape, almost as large as the *avicularia.* This species, according to him, frequents humid places, kills and sucks large insects, *kakkerboks* (cockroaches), and often its own congeners. He maintains that this mygale often perishes by the sting of a sort of gad-fly under the belly, most probably in the organs of respiration. The touching of its hairs produces severe sweatings, similar to those caused by the introduction of certain caterpillars. One morning, says a traveller in Surinam, as I was getting up, one of the Spaniards made an exclamation on seeing on my garments, from the feet even to the shoulders, a brown trace occasioned by the passage of one of these crab spiders; and by an acrid and caustic liquor which distils continually from its mouth and feet. Happily it passed innoxiously, and contented itself with thus leaving its (visiting card.)

Dr. Russell says, that at Aleppo when food has been left exposed on the terrace, which is frequently done before supper in the summer, he has known several instances of a whole company being unaccountably seized with vomiting and other symptoms resembling those produced by poison. The natives ascribe such accidents to venomous animals passing over the victuals, more especially a kind of spider which emits a deleterious juice; but he adds, he never saw one of them.

Another of the same division (*valentina*) has been found in the arid soils and deserts of Modenta in Spain, by M. Dufour.

The female mason-spider (*cœmentaria,*) which is of a reddish-brown colour, is found in the southern departments of France, on the shores of the Mediterranean in Spain, &c.

The *aranea picea* excavates in inclined soils covered with turf, a tube, seven or eight inches in length, at first cylindrical, afterwards inclined, where it spins a tunnel of white silk, of the same form and the same dimensions. The cocoon is fixed with some silk, and by the two ends to the bottom of this tunnel. It is found in the environs of Paris and of Bordeaux; and M. de Bazoches has observed near Séay, a variety which is of a clear brown.

The *aranea nobilis,* or golden spider, is a beautiful species. It has eight eyes and eight legs. The thorax is of an elegant orange-colour, spotted with six black spots; the abdomen of a bright yellow, with larger deep black spots; the legs half black and half yellow. It is a native of Sumatra.

Mr. White mentions, in his Journal of a Voyage to New South Wales, a very large spider, which he names the white-jointed spider, from the fact of each joint being white. He remarks, "Unless the species be seen in the utmost state of perfection, they are not easily distinguished. It is most remarkable for the lucid surface of its thorax and legs, which latter are furnished with several long moveable spines, that may be either elevated or depressed, at the will of the animal. The eyes, eight in number, are arranged in the same manner as those of the *aranea avicularia.* Its colour is a clear chesnut-brown, except the body, which is a pale brown, with a very deep or blackish fascia on its upper part, reaching about half-way down. The orifice at the tip of each fang is very visible by so slight a magnifying power as that of a glass of two inches focus; this spider is, therefore, of the number of those which poison their prey before they destroy it."

Hughes describes five species of spiders in Barbadoes:—

The house spider—a dark brown hairy insect, having a large head, joined to the abdomen by a slender ligament; the body supported by eight legs, the two foremost extending above two inches asunder. Near the mouth come out two short, though strong, feelers. It carries its young in a small white bag under its belly. Though the sight of these spiders is not agreeable, yet are they serviceable in houses, by destroying cockroaches, which are both offensive by their smell, and destructive to victuals, clothes, and books.

The field spider very much resembles those of the same species in England.

The flat-backed spider, in the number of its legs, and the make of its forceps, resembles the Indian tarantula, differing chiefly in the number of its eyes, which in the latter are eight, in the former, two. The bite of this is very near as painful as the stinging of the Surinam scorpion, causing an immediate swelling, with acute throbbing pain, which continues for several hours without intermission.

The golden spider is so called from the bright gold-coloured lists with which its legs, and some part of the body, are marked. It spins its web in the open air, generally among the branches of the large American touch-thistle. This appears to be the same described by the travellers in Jamaica.

The slender-legged spider spins a web much resembling that so often found among hay or stubble-ground in England in harvest time.

In Gosse's very interesting "Sojourn in Jamaica," he thus describes the appearance of some of these curious creatures:—"Among the joints of the tangled prickly pear, many vertical spiders' webs were hung, some of which were of sufficient strength to offer considerable resistance to the hand. I looked at the tenant, and found it to be *nephila clavipes,* or brush-footed spider, a creature of exceeding beauty. It is of large size, being an inch and a half in length, exclusive of the legs, which extend over a space five inches in diameter. The body is lengthened and studded with round white spots, each environed with a black border, on a rich greenish-brown ground, reminding one of the characteristic marking of the *tragopans* among birds. The cephalo-thorax is shining black, its lustre half concealed by a clothing of short silvery down; the legs are very long, and have a remarkable appearance from having a bunch of black hair set around the extremity of the first and second joints, like the bristles of a bottle-brush; the third, or short pair of legs, however, is destitute of these appendages. These peculiarities impart an interesting character to this fine spider, which seems also to have a wide geographical range, extending from Florida, and perhaps Georgia, to the Bermudas,—all through the Antilles, and even over the continent of South America as far as Brazil. Its web is perpendicular; the part on which the spider sits, head downward, is geometric, but this is surrounded on all sides by a vast array of irregular lines, the frame of which consists of compound threads, stretching from the surrounding trees and shrubs. Some of these threads are twelve feet long, of a yellow colour, and nearly as thick as sewing silk: I have found them able to resist a great pressure without breaking. But I think it utterly improbable that the rapid and powerful flight of even our most minute humming-bird could be for a moment arrested by the web of this or any other spider.

"One of my servants informed me in September that he had been bitten by one of these large and handsome spiders. Coming through the woods at early dawn, his face came into collision with one of the strong webs. He stopped to brush it off, and immediately felt some large insect run down his body, which presently bit him on his great toe. The pain was less severe than that following the sting of a wasp, or even than the puncture of a *tabanus;* but he described it as having three distinct paroxysms (if I may use such a term for so small a matter). The pain was not of long duration. But to return to the individual which was now attracting my interested attention. Several young ones were scattered about the net of one of large size, each of which hung head downward on the threads in the manner of the adult, remote from her, and from its fellows. Hence, it would seem, that the young of this species learns its first fly-catching lessons on the parental web, and is not sent into the world to practise on its net-weaving trade, until it has some size and strength. Most of the nets, however, in the prickly-pear bush, were occupied by spiders (*gastera cantha*) of smaller size, but equally curious; the abdomen having a shell-like hardness and polish, and being hexagonal in form, with the angles produced into sharp points. There seemed to be two species of these, some having the abdomen of a dull red, and others, the more common, of a porcelain whiteness."

In Sir Hans Sloane's Natural History of Jamaica, there is a representation of a spider, which has the four pair of legs set on the corslet by couplets, two pairs pointing forwards and two pairs backwards. In his delineation of the geometric web there are a few zigzag lines. These are said by Mr. Hill to be the feeble notices of a very special instinct. "The creature itself (says Mr. Gosse), an insect of much beauty, fell under my own observation. It was at Culloden, an estate near Bluefields, Jamaica; the undulating and down-like pastures of which are thickly studded with palm-trees, chiefly of the fan-thatch and the bristling ebby palm. Immense clumps of prickly-pear have spread themselves over the rocky surface, and among the oval nodes of these were placed many irregular perpendicular nets, geometric towards the middle. The very centre of each web was occupied by an elegant spider, hanging head downward, the upper part of whose body was of a glistening satiny or silvery whiteness, the belly yellow, spotted with black, and the legs marked with alternate rings of the same contrasting hues. It was the *epeira argentata* of Fabricius, or a species closely allied to it. The interesting peculiarities detailed in the following communication from my friend, escaped my own observation, in my eagerness to secure the specimens, of which I took three. The season was May, but Mr. Hill's facts were observed in January.

"In a garden passage, bordered with a hedge of the *triphasia limonia trefoliata* of Linnæus, a spider's web had attracted my attention, in consequence of its containing in the centre a thick tissue of zig-zag lacings, which gave it the appearance of being ornamented with a Saltier cross. On examining what there was peculiar in the spider to lead to the peculiarity in the web, a little observation rendered the whole apparent. The arrangement of the legs of the species, an *araneus cancriformis,* as Sloane describes it, differs from that of the generality of spiders. They are set upon the corslet in double pairs, the doublets close together, two pairs before, and two behind: the two forelegs of equal length, but the two hind ones slightly unequal. In the ordinary position of the spider, when in a state of watchful repose in the centre of his web, the four double legs, representing the cross usually called St. Andrew's Cross, are extended out so as exactly to cover the zig-zag lacings, that form precisely a similar cross. The anomalous structure of the spider's legs, in the mere necessities of wear and tear, rendered requisite this thickening of the web in the spots where the legs rested; and the whole economy indicated a relation of fitness, usefulness, and consistency, very special in character. All the web, except about some half-inch of the centre, was composed of the usual radiated lines with concentric intersections. The centre was a sort of off-set disk of irregular meshes, to avoid the crowding together of the radiations before they converge to a point. Immediately beyond this disk, stretching through about an inch of the rays, the zig-zag lacings were extended, and so overlaid, as to make up a mass of thickened tissue, about twenty or thirty times the thickness of single threads, or of the warp and woof of other portions of the web.

"By some accident the web I first noticed got destroyed; but, in the course of a single day, I found the spider had rebuilt the web in the same hedge some ten yards further away; and though the new web was not so strong, nor so carefully constructed as the preceding one, it was yet formed with the same peculiarities of zig-zag lacings of a thickened tissue corresponding to the Saltier position of the spider's legs. I have since met with some of these spiders (they are rather scarce) and the same peculiarity prevailed in all. Sloane evidently noticed it, but does not seem to have understood its purposes."

The jumping spider, or *aranea scenica.*—The manners of the jumping-spider are very singular. It does not, like many others, take its prey by means of a net, but is constrained to seize them only by its own activity. It is extremely nimble, at times leaping like a grasshopper, then standing still, and raising itself on its hind-legs to look around for its prey. If it sees a fly at the distance of three or four yards, it does not run directly to it, but endeavours, as much as possible, to conceal itself till it can arrive near; and then creeping slowly up, and but seldom missing its aim, it springs upon the insect's back, and it is then almost impossible for the fly to effect an escape. But if, before the spider gets to it, the fly take wing, and fix upon another place, the little animal whirls nimbly about, and still keeps its eyes upon it, in order to commence a fresh attack. Dr. Brookes says, it has been sometimes seen in the act of instructing its young one how to hunt; and also that, whenever an old one missed its leap, it would run from the place, and hide itself in some crevice, as if ashamed of its mismanagement.

Bertram tells us of a remarkable kind of spider he met with in Florida. He says, "As I was gathering specimens of flowers from the shrubs, I was greatly surprised at the sudden appearance of a remarkably large spider on a leaf, of the genus *aranea salticus;* at sight of me he boldly faced about, and raised himself up, as if ready to spring upon me; his body was about the size of a pigeon's egg, of a buff colour, which, with his legs, were covered with short silky hairs; on the top of the abdomen was a round red spot or ocella, encircled with black. After I had recovered from the surprise, observing that the wary hunter had retired under cover, I drew near again, and presently discovered that I had surprised him on predatory attempts against the insect tribes. I was therefore determined to watch his proceedings. I soon noticed that the object of his wishes was a large fat bumble bee (*apis bombylicus*) that was visiting the flowers, and piercing their nectariferous tubes: this cunning intrepid hunter conducted his subtile approaches with the circumspection and perseverance of a Seminole when hunting a deer, advancing with slow steps obliquely, or under cover of dense foliage, and behind the limbs; and when the bee was engaged in probing a flower, with his back next the spider, he instantly sprang upon him, and grasped him over the back and shoulder, when for some moments they both disappeared. I expected the bee had carried off his enemy, but to my surprise, they both together rebounded back again, suspended at the extremity of a strong elastic thread or web, which the spider had artfully let fall, or fixed on the twig, the instant he leaped from it; the rapidity of the bee's wings, endeavouring to extricate himself, made them both together appear as a moving vapour, until the bee became fatigued by whirling round, first one way, and then back again; at length, in about a quarter of an hour, the bee, quite exhausted by his struggles, and the repeated wounds of the butcher, became motionless, and quickly expired in the arms of the devouring spider, who, ascending the rope with his game, retired to feast on it under cover of the leaves; and perhaps, before night, became himself the delicious evening repast of a bird or lizard."

A small spider was seen in great abundance in Melville Island, running on the ground, as well as on various plants, and leaping when alarmed. Mr. Kirby had an opportunity of examining only a single specimen, which was so defective, from injury, that he could not name with certainty the genus to which it belonged; but from its leaping propensities it was inferred to belong to *salticus* of Latreille. To whatever genus it pertains, the specific name of *melvillensis* is now bestowed upon it.

The *aranea viridiprina,* or *smaragdula,* is of a middle size, of a grass-green, with the sides edged with a clear yellow, and the abdomen of a greenish yellow, cut on the middle of the back by a green line. It collects three or four leaves together in a triangular pocket, lines the interior with a thick silk, and places its cocoon in the middle, which is round, white, and allows the egg to appear. It has been found in France, and in the most arid mountains of the kingdom of Valencia. It runs with velocity, the feet being laterally extended. Its feet, cushioned, and furnished with claws, give it the facility of working itself on the smoothest surface, and in every position. It fixes, at the lower face of the fragment of rocks, a cocoon, which is very like the cloth of Durand in texture. There it retires to shelter itself from its enemies, and to lay its eggs. It is an oval rent, nearly two inches in diameter, applied on the stones like the marine *patellæ.* It is composed of an external envelope, of a yellowish taffeta, as fine as the peel of an onion, but capable of resistance, and of an interior more supple sheath, open at the two ends. It is through apertures provided with valves that the animal comes out. The cocoon for eggs is globular, placed underneath its dwelling, so that the spider can cover it; and it contains about sixty eggs.

A species called by Dufour and Cuvier *tenelops,* of a reddish grey, with ash-coloured spots, and black rings to the feet, has been found in Valencia; but it is very rare there. It is also found in Syria. It inhabits rocks, and runs with the rapidity of an arrow. Egypt, Senegal, the Cape of Good Hope, and the Isle of France, furnish other specimens of the same subgenus.

The *aranea margaritarius*, or *philodrontigre*, is of a reddish fawn-colour, brown laterally and posteriorly, and white in front. The abdomen is striped like a tiger, by means of the red, brown, and white hairs with which it is invested. The feet are long, slender, reddish, with brown spots. It is very common on trees, wooden partitions, walls, &c., and sticks there with the feet extended, as if it were glued. As soon as touched, it takes to flight with extreme rapidity, or lets itself fall, by unwinding a thread which supports it. Its cocoon is of a fine white, and contains about one hundred eggs, which are yellow. It places it in the clefts of trees, or of parts exposed to the north, and watches it assiduously.

One of the most singular species of spider, called by some naturalists *clotho*, by others *uractea*, resembles much, in the short form of the body, and length of its feet, the spider-crab, or *thomisus*. It has been found in Egypt, and in Dalmatia. It makes, at the interior surface of large stones, and in the clefts of rocks, a cocoon, in the form of a cap or little dish, a good inch in diameter. Its contour presents seven or eight emarginations, of which the angles alone are fixed upon the stone by means of bundles of threads, while the edges are free. This singular tent is of an admirable texture; the exterior resembles the finest taffetas, composed, according to the age of the worker, of a greater or less number of drillings. Thus, when the *uroctea,* as yet young, commences to establish its retreat, it only fabricates two webs, between which it remains in shelter. Finally, when the period marked for reproduction arrives, it weaves a cell for this very purpose, more downy and soft, where the sacs of eggs, and the young ones newly disclosed, are to be shut up. Although the external cap or pavilion is designedly, without doubt, more or less soiled by foreign bodies, which serve to conceal its presence, the apartment of the industrious fabricator is always scrupulously clean. The pouches which enclose the eggs are four, five, or even six, for each habitation, which, nevertheless, forms but one domicile. These pouches are of a lenticular form, and are more than four lines in diameter. They are formed of a sort of taffeta, as white as snow, and furnished internally with a down of the finest kind. It is only at the end of December, or in the month of January, that the laying of the eggs takes place; therefore are their progeny provided for beforehand, against both the rigour of the season and hostile incursions. The receptacle of this precious deposit is separated from the web, immediately applied upon the stone by a soft down, and from the external cap by the various stories described. Among the emarginations which border the tent, some are altogether closed by the continuity of the stuff; others have their edges simply lapped over, so that the *uroctea*, by raising them, may issue at will from the tent, and re-enter. When it quits its domicile to proceed to the chase, it has little cause to fear that its habitation should be invaded, for itself alone possesses the secret of the impenetrable emarginations, and the key to those by which it can introduce itself. When the young ones are in a state to do without maternal cares, they take their departure, and proceed to establish elsewhere their particular habitations, while the mother dies in her own tent. Thus the last is at once the cradle and the tomb of the *uroctea*.

One kind of spider, called by some naturalists *drapi*, remain under stones, in the clefts of walls, and the interior of leaves, and there fabricate cells of a very white silk. One of the largest of these is found in the high mountains of the Pyrenees, and never below the Alpine zone. One of the prettiest, often found in France, is very small, almost cylindrical, with the thorax fawn-coloured, covered with a silky and purple down; the abdomen mixed with blue, green, and red, with metallic reflections, and two transverse lines of a golden yellow, the anterior of which is arched. Some of these have but six eyes.

The water-spider, or *argyroneta aquatica.*—This singular little creature is a very common inhabitant of our fresh or stagnant waters; when in the water its belly appears as if covered with a silver varnish. This is, however, nothing more than a bubble of air attached to the abdomen by the oily humours which transpire from the body, and prevent the immediate contact of the water. By means of this kind of bubble, the insect forms its dwelling under the water. It fixes several silky threads to the stalks of the water plants, and then, ascending to the surface, thrusts the hinder part of its body above the water, drawing it back with so much rapidity as to attach beneath a bubble of air, which it has the art of detaining below, by placing it under the threads above-mentioned, and which it bends, like a covering, almost round it. It then again ascends for another air bubble, and thus proceeds till it has constructed a large aerial apartment under the water, which it enters or quits at pleasure. The male constructs for himself one near that of the female, and afterwards breaks through the thread walls of the female's dwelling; and the two bubbles, attached to the bellies of both, unite into one, and form one large chamber. Bernardin de St. Pierre observes on this, "The Romans who constructed, on the shores of Baja, saloons underneath the waves of the sea, in order to enjoy the coolness, and the murmuring voice of the waters during the heat of summer, were less dexterous and less voluptuous; but they are short-lived.

The female of this species of spider watches carefully over her eggs, and does not abandon them till they disclose their young, constructing similar apartments for them. They bind their prey with cords spun from their own bodies. The figure of this spider has in it nothing remarkable, and will be overlooked among a crowd of curiosities, if the spectator be unacquainted with its singular art of constructing its aerial habitation under water, and thus availing itself of the properties of both elements. It lodges, during the winter, in empty shells, which it dexterously closes up with a web.

The *aranea livida*, spoken of by Donovan as a new species, not being described by Linnæus, Folicius, or any other entomological writer of his knowledge, is of a gigantic size, found in this country in the water. The prevailing colour of the upper surface is darker than the lower; it is a livid brown, faintly variegated with reddish. On close inspection the thorax appears to be obscurely lineated and dotted with blackish, radiating from the ridge of the back, as from a centre towards the outer margin; the legs also are lineated with about four or five equi-distant blackish lines sprinkled with a few dots, slightly hairy, and sparingly beset with small satiform spines; the abdomen rather downy; eyes eight.

The plant-mite, or red spider, *acarius telamis.*—A small insect of the class of *arachnida,* scarcely visible to the naked eye, does considerable injury to various plants in warm dry summers. This mite has eight legs, like most of the *arachnidæ;* its colour changes from a clear scarlet colour to a straw colour; when yellowish it is full grown, and on each side of the back is a blackish or brown spot. In the open air it usually attacks kidney beans. Among trees, the young limes principally suffer, and the mites are found in thousands on the under side of the leaves. These leaves assume a dirty yellow or brownish appearance, and in the middle of summer the trees acquire an autumnal hue. In the Linden-walk, on the glacis at Vienna, several of the trees suffer every year from this evil. In winter, the insect is found on the bark. In hot-houses the red spider feeds during the whole year, and is a great pest to planters and gardeners. It spins a sort of web over the leaves, particularly on the under surface, and sucks the juice of the plants with its rostrum, which completely enfeebles and defoliates them. Frequently sprinkling the plants with cold water, and fumigating the hot-houses with strong tobacco smoke, also watering such plants as will bear it, with strong tobacco tea, injures these insects in some degree, and is sometimes successful in destroying them.

Acarus holosericus, or plant-mite, another red spider of minute size, visits peach and nectarine trees, and some others, before the least vestige of foliage appears. At this time it is of a very small size, and quite red. When it becomes full grown, it is changed to a red-brown colour, much of an oval shape, except the head part, which is a little more obtuse than the reverse end, and the whole body is flat, furnished with six legs, and two antennæ or horns. It may just be distinguished with the naked eye. It feeds till the latter end of May or beginning of June, when the female deposits her eggs, and afterwards dies. But even so early as the month of February, when the weather proves favourable, these little animals, which for several months have been motionless, wander with great activity over the trees, hunting for food, but are frequently under the necessity of retiring without obtaining it. They principally derive their support from the leaves, and partly from the bloom. The trees being thus attacked, at so early a period of their growth, the mischief they commit is very great. They bite the edge of the leaves as they burst through their corticated covering, which for several weeks prevents the shoots making any progress, weakens the bloom, so that it drops off and deprives the leaves of their juices, so that the sun and wind shrivel up their edges, and produce the appearance as though they had been scorched with fire. These, together with the *acarus telamis*, attacking the trees at so early a period, are no doubt the cause of what is commonly misconceived and very improperly termed a blast, caused by cold east winds, or something in the air which cannot be accounted for; as they are not winged insects, it would not be probable they were borne on the wind. After the leaves are pretty well expanded, this species feeds on the top side of them, which gives them a light freckled appearance. All the species of red spider, which appear to annoy vegetation, have so much the resemblance of each other, that it were needless to attempt defining small differences only to be discerned by an entomologist, by the aid of a microscope; but it stands out in its littleness as a warning to you, dear children, not to despise the day of small things; but to be as much in earnest in the spring time of life in acquiring the excellence of knowledge as these minute creatures are in procuring to themselves the sustenance which the early buds afford them, to the future destruction of the plant.

There is a singularly flat and minute hard-shelled six-eyed spider, with a sessile abdomen, which is to be found in Cuba among old papers and in boxes of insects, and which passes off directly to the *acaridea*, or order of mites.

The *acarus pectinatus*, or pectinated mite, is about the size of the common domestic mite, or *acarus sico* of Linnæus, and is found in similar situations; it is, however, a much rarer animal. It has eight legs, two eyes, situated on each side the head; two feelers, jointed, leg formed.

The *acarus auratus*, or gold-spotted acarus, is usually of a pale greenish brown, variegated with minute specks of black; but, when immersed in spirits of wine, and magnified by a microscope, is adorned with marks of no inconsiderable splendour; the upper part of the body being furnished with three, and sometimes more large spots, of a golden tinge, accompanied by a metallic lustre. It is often found attached to the bodies of snakes.

In Upper Egypt, the inhabitants, even of the better order, are covered with lice. When they are bitten by one of these, they take it carefully and place it upon the sofa on which they are sitting, from whence it soon crawls either to their own person again or to that of another. Whatever precaution I could take, I was obliged to submit to the torments inflicted by these hateful insects, which are here large and uncommonly voracious.

Phalangium bimaculatum is a minute black spider with two white spots; abdomen rounded. Found among a variety of other spiders in this country about the middle of August.

Laneroid phalangium, or *phalangium dubium,* or doubtful phalangium. Legs, eight; eyes, two vertical and two lateral; antennæ resembling legs; abdomen rounded. Swammerdam has described it as a species of scorpion; some make it an acarus. It varies considerably in size. It is usually found on the walls and sometimes among papers, and is not a very common insect.

Phalangium fuscum, or brown, with minute dorsal claspers. This species is supposed to be a native of some of the American coasts. It is an insect that seems not to have been much noticed.

LIST OF THE SPIDERS OF GREAT BRITAIN AND IRELAND.

Telarius.—Tawny; a brown spot on each side of the abdomen. According to Geoffrey, this insect spins a web on the bark of trees, generally on the north side, from top to bottom of the trunk; which web being dispersed by the wind, covers the fields with those innumerable threads which some naturalists have mistaken for condensed vapours.

Phalangium opilio, long-legged spider.—Antennæ angular; palpi two, long, like antennæ; legs very long; eyes on the top of the head or thorax; head and thorax both in one; abdomen, above brown, beneath white.

Casaroides.—Antennæ cheliform; thorax brown; abdomen transversely striated. On garden pots, and sometimes in houses.

Aranea.—Spiders; legs eight, eyes eight.

Diadema.—Abdomen gibbous, red-brown, with white spots in the form of a cross.

Cucarbitina.—Abdomen gibbous, green-yellow, with black spots. On fruit trees.

Domestica.—Abdomen pale-brown, with five black spots; somewhat hairy.

Labyrinthica.—Thorax grey, with three longitudinal lines; abdomen brown, with a longitudinal pinnated line; tail forked, large. In fields.

Redimita.—Abdomen oval, pale-yellow, with a crimson oval crown or ring on the back; legs long, white, transparent. In gardens.

Montana.—Abdomen, with grey spots, sides white; thorax and legs pale; fore-feet long, extended.

Extensa.—Abdomen long, green-silver; legs livid, long, extended.

Holoserica.—Brown livid, hairy; abdomen ovato-oblong with two truncated appendices, and two tubercles beneath.

Senoculata.—Eyes only six, yellowish, downy; abdomen sub-cylindrical, with quadrangular black spots on the anterior part, and yellow lines on the sides, large. On walls, &c.

Scenica.—Black, covered, with short silvery hair; abdomen sub-cylindrical, with three oblique white lines on each side; legs short, hairy, black and white; skips. On old walls and windows—weaves no web.

Aquatica.—Pale brown; abdomen oval; jaws black, large, strong; length five lines. In lakes. Lives and hunts at the bottom of the water, devouring its food within a globule of air formed by itself.

Viatica.—Thorax black-brown; abdomen large, yellow, with two brown spots; four fore-legs long, black and yellow, four hind-legs short; resembles a crab, moves slow, length two and half lines.—*Outlines of the Natural History of Great Britain and Ireland, by J. Berkenhout.*

If a creature that is naturally forbidding of aspect, and displeasing to us in many ways, be held up to us by the Word of Inspiration itself, as an example of industry, shall we not profit by it, so as to refresh our memories with the many great and precious promises with which Scripture abounds; and to stir us up to run, with patience and diligence, the race that is set before us? Like those self-contained advantages with which our Creator has possessed one of the meanest of His creatures, we also must have the means of grace within us, before we can work the work of Him from whom all good gifts come; but of these, as true believers in Christ, blessed be His name! children as we be, and "little upon earth," we are already in possession. But to whom much is given, of them much will be required. Oh, then, let us not be slothful in business, but fervent in spirit, serving the Lord.

First, we must "incline our ear unto wisdom;" we must next "apply our hearts to understanding;" then, "cry after knowledge," and "lift up our voice for understanding." Then, as if attention, and heartfelt application, and earnest prayer, were still but *first* steps, we must dig deeper and deeper still for that, "whose price is above rubies," whose "path no fowl knoweth," nor "vulture's eye hath seen;" where the "lion's whelps have not trodden," nor "the fierce lion passed by it;" we must "seek for it as silver," and "search as for hid treasures." "Then shall we understand the fear of the Lord, and find the knowledge of God;" and, if the diligence of the spider find her a place in "king's palaces," what shall be our reward? Shall not our eyes "see the King in His beauty? shall they not behold the land that is very far off?"

In the place where I write, the tens of thousands inhabitants of our largest commercial city are busily preparing to welcome their Sovereign for a few hours' stay, and many a heart rejoicing in the prospect of gaining a transient glimpse of her. Shall we be less in earnest, dear children, in preparing for our King?

Oh! let us not give sleep to our eyes, nor slumber to our eyelids, till we make in our hearts an habitation for Him who hath promised to dwell with him that is meek and contrite, and who trembleth at His word. Let us work while it is called to-day, that when our labours are over, we may be welcomed by, "well done, good and faithful servant;" and made meet to dwell for ever in the King's Palace.

THE END.

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